# PAINT and VARNISH Production

THE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHES



## THERE ARE BLONDES AND BRUNETTES *In* TALL OIL GLOSS OILS *Too!*

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MARCH
1953

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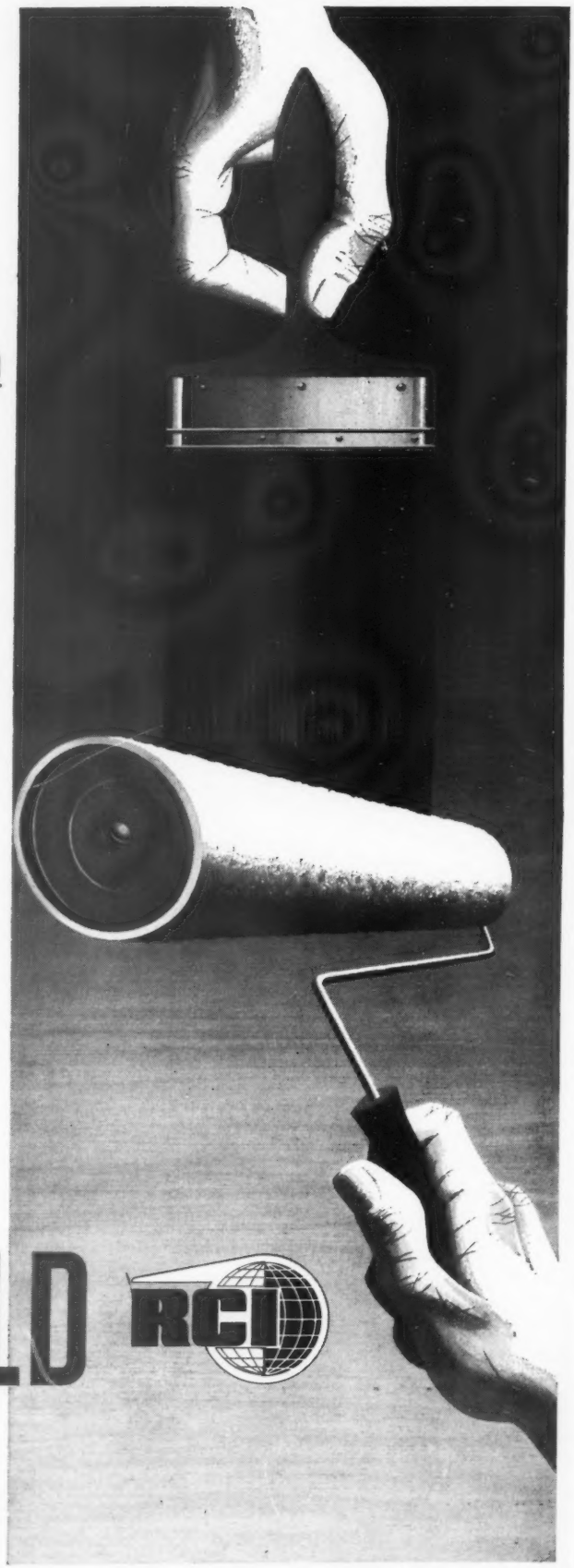


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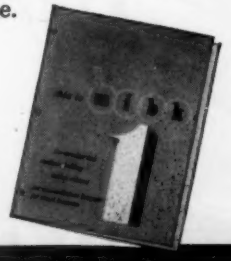

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# PAINT and VARNISH Production

Formerly PAINT and VARNISH PRODUCTION MANAGER
(Established in 1910 as The Paint and Varnish Record)

VOL. 43 MARCH, 1953 NO. 3

## Editorial

### Answer the Call

Every month in the year, thousands of people in distress, reach out to the Red Cross for the help they must have, help that comes from the generous efforts and support of housewives, businessmen, industrial workers, school children, professional workers — your next door neighbors — and countless others who serve their fellow man through the Red Cross.

Although the heart and hands of the Red Cross are provided by hundreds of thousands of volunteers, money is also needed to collect blood; to provide financial assistance for servicemen, veterans, and their dependents; to furnish emergency aid and rehabilitation to disaster victims — service that can be provided only through the voluntary financial support of millions of Americans.

Every March, Red Cross volunteers turn to their neighbors and ask help in answering the call of those in need. Let us respond generously to this appeal so that we can answer the call of humanity through our Red Cross.

### Color Dynamics in Washington

When Senator Wallace F. Bennett (R. Utah) went to Washington some two years ago, one of the things he didn't like was the tan walls of his office. He wanted light green but ran into a "snag" with the custodian and the Senate Rules Committee. After much persuasion, and his offer to supply the color of his choice from his own paint manufacturing company in Salt Lake City, he was able to have green walls.

Other senators admired the new colored walls. Many dropped in, paid their compliments, and heard the story of the "battle of the paint brush".

When the shuffling of office space began in January, many Senators, old and new, asked for a different color paint. The most popular shade — and the only one authorized by the custodian and Rules Committee — was light green.

The only thing Senator Bennett has to say about the whole matter is: "My colleagues don't get their paint where I got mine, but at least it's not tan".

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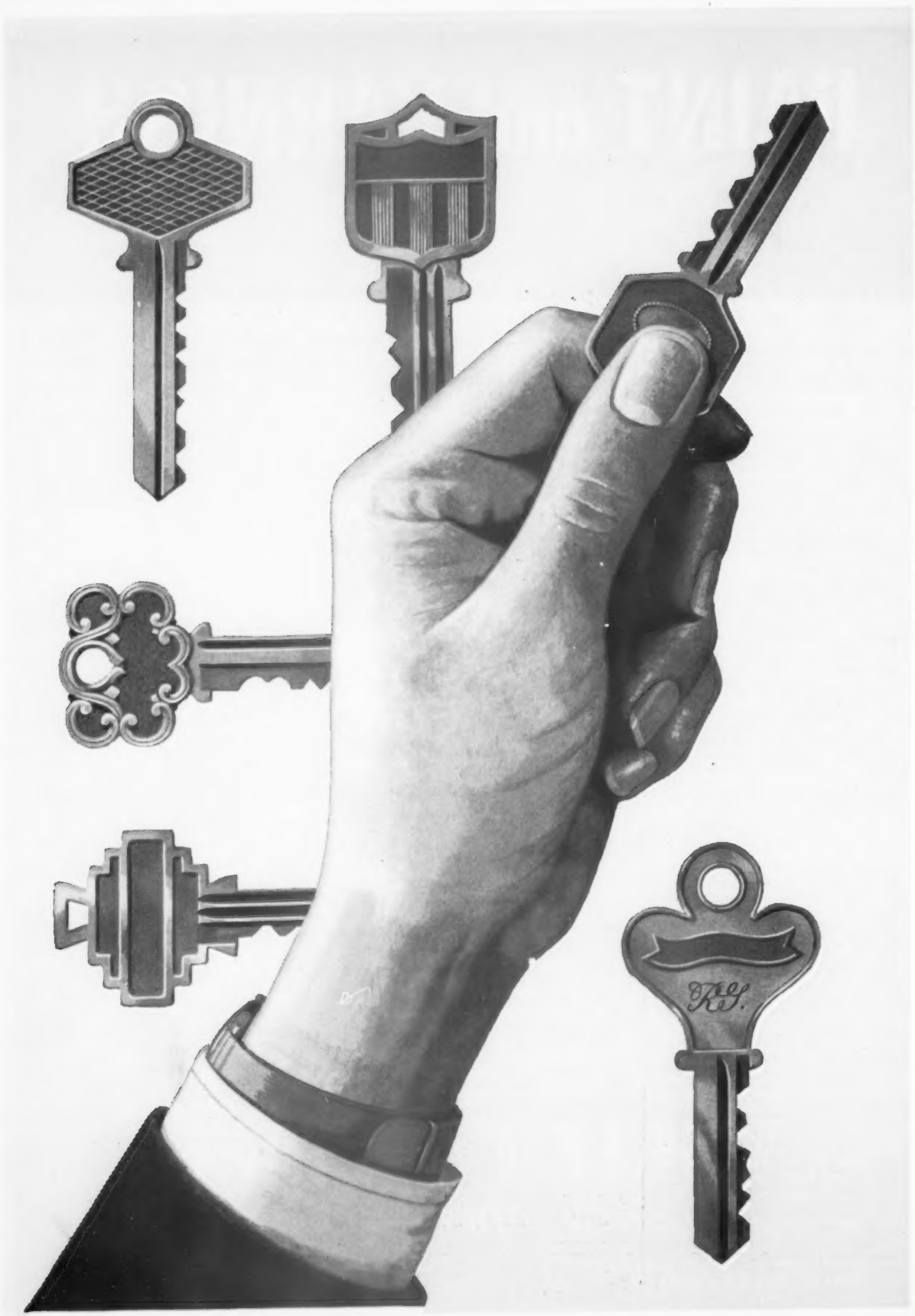

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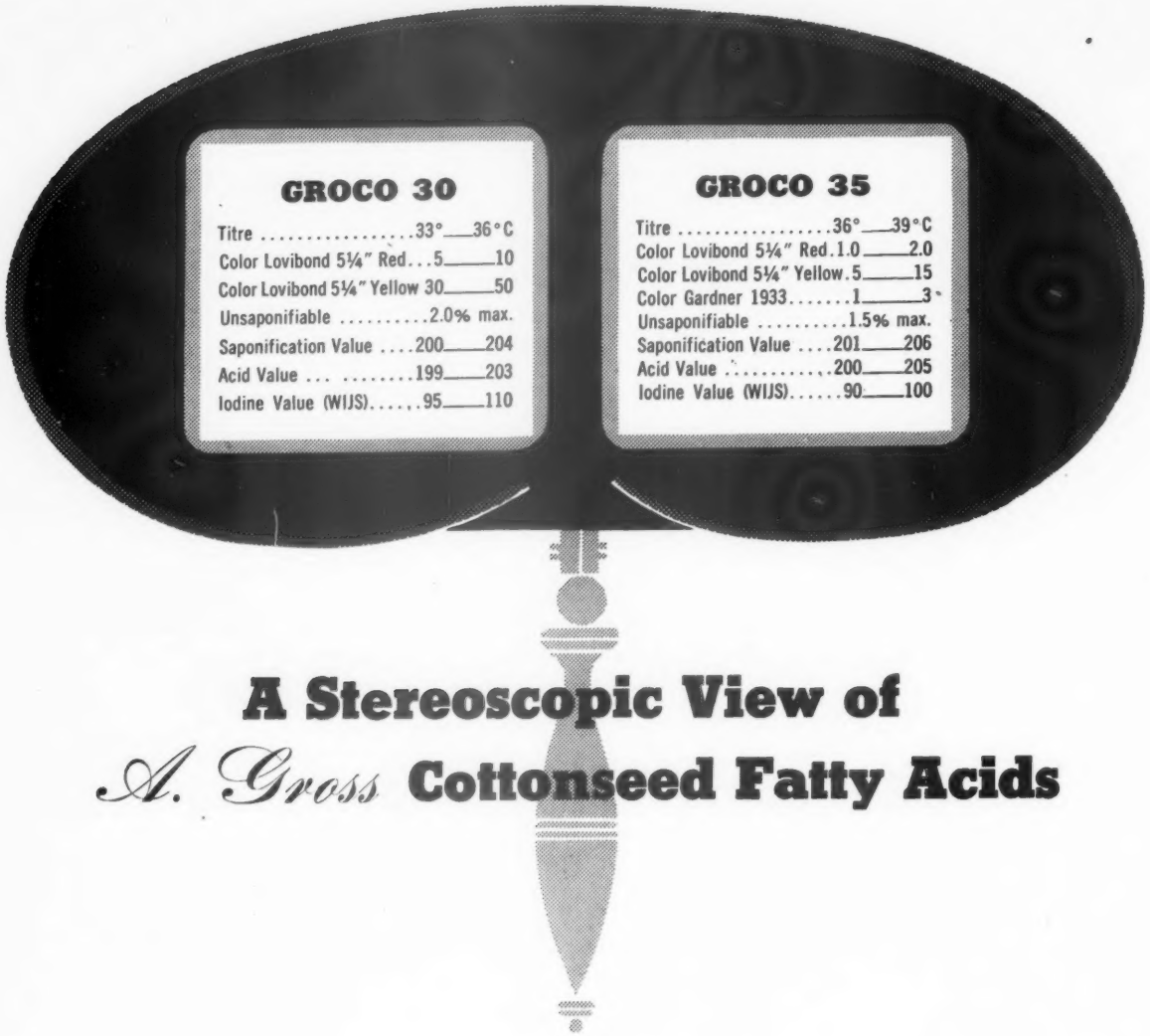


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> "The housekeeper has been particularly happy with the washability."

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ASP

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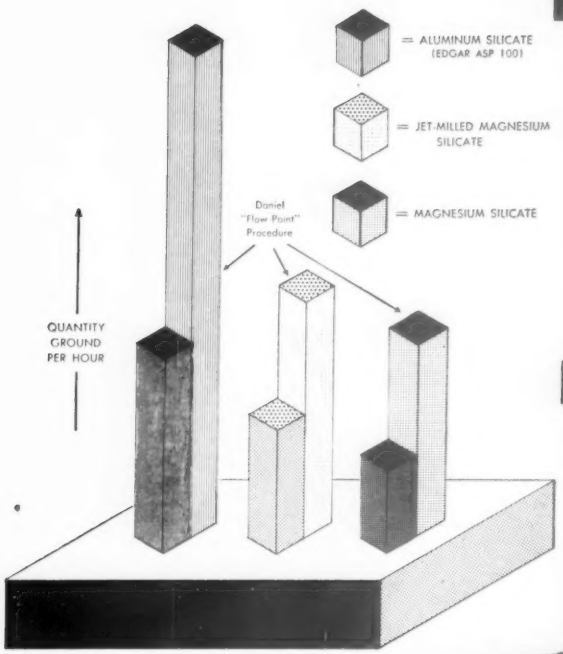

= ALUMINUM SILICATE (EDGAR ASP 100)
= JET-MILLED MAGNESIUM SILICATE
= MAGNESIUM SILICATE
Daniel "Flow-Point" Procedure
QUANTITY GROUND PER HOUR

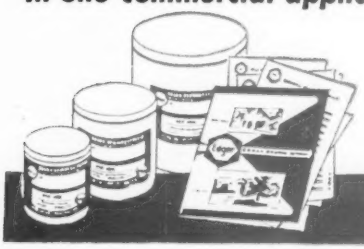
## THE FACTS ABOUT THIS TEST:

The test consisted of grinding Zinc Chromate Primer (Government Specification: MIL-P-6889A) in a pebble mill. The length of the bars in the chart to the left shows the quantity of paint ground per hour to the Hegman Fineness required by the specification. In the case of the bars to the front, the charge to the pebble mill was in accordance with the test formula in the specification. For the bars to the rear, the same paint was prepared but the charge to the mill was calculated according to the Daniel "Flow-Point" Procedure.

## AND HERE IS HOW IT CAN WORK FOR YOU:

This test, involving one of the most difficult formulations to grind, clearly shows the ease and speed of grinding due to the inherent softness and controlled fine particle size of EDGAR ASPs. EDGAR ASPs are non-abrasive and can be safely ground on a three roll mill even in cases of high pigment loading without risk of abrasive action on the rolls and consequent discoloration of the paint. Though this is just one example of the ease of grinding of EDGAR ASPs, you will find similar satisfying results in other formulations . . . both in reduction of production costs and resultant finer products.

***In one commercial application, for instance, grinding time for this formulation of Zinc Chromate Primer was reduced approximately 66%***



This is only one reason why EDGAR Aluminum Silicate Pigments improve your product. For complete facts and advantages, send for technical literature, as well as samples for your own laboratory testing . . . no obligation, of course.

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Metuchen, New Jersey

# the chemist's page

**Nuact Paste stabilizes drying**

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- Decorative can enamels.
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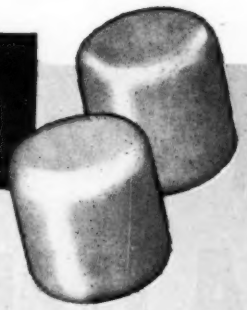
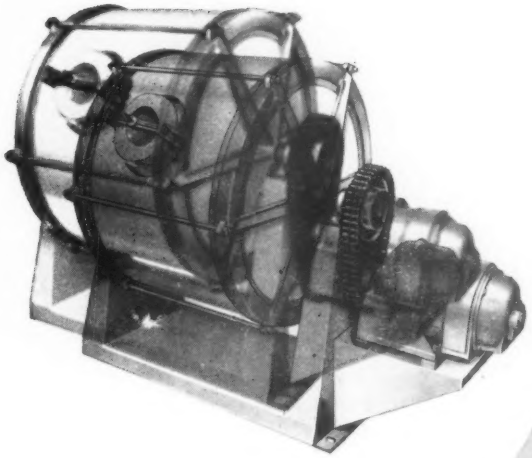
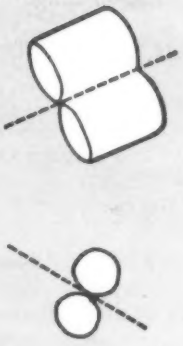
# Burundum





It's a fact!! You'll see practically double the production from your mills when you use Burundum, the cylindrical grinding medium.

Many paint manufacturers are getting faster, finer grinds through the simple substitution of Burundum for other non-metallic media. One paint maker reports the grinding of a standard chrome green in an alkyd vehicle was accomplished in 23 hours with Burundum as compared to 46 hours for flint pebbles. Another slashed the grinding time of a gray enamel from 80 to 42 hours with Burundum. Still another ground a zinc chromate primer in just under half the usual time by using Burundum. You, too, can make substantial savings in time by switching to Burundum.



Burundum's tubular shape means greater grinding contact area. No matter how the media falls contact area is greater than the pinpoint contact characteristic of spherical media.

The main reasons for the greater grinding efficiency of Burundum are its unique form, high density, and high specific gravity. Combined, they give you faster action, greater attrition, less "floating" and "packing".

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Why don't you get more out of your mills, by putting Burundum in?

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**SINCLAIR ODORLESS SOLVENT LIGHT**
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Kauri-Butanol Value .....26

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IBP.....375°F EP.....465°F
Kauri-Butanol Value.....25

To meet distillation range requirements of paint manufacturers, Sinclair offers not one, but two types of odorless mineral spirits . . . Sinclair Odorless Solvent Light (350-400°F.) and Sinclair Odorless Solvent Heavy (375-465°F.). These new Sinclair Products are made from carefully selected petroleum fractions to insure the uniformity, stability and superior quality demanded by manufacturers of odorless paints for interior decoration.

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Need a single compound that can provide you with *both* fatty and rosin acids? Then ACINTOL D is what you have been looking for. And besides convenience in application, you'll like ACINTOL D for two other reasons:

- it's economical to use
- it's readily available from domestic supplies

We would also like to remind you that Arizona specializes in tall oil. That's why you can be sure of *consistent quality* from order to order.

## ACINTOL® D

**Distilled Tall Oil**

*Typical Analysis*

| | |
|---|---|
| Color (Gardner) | 9 |
| Acid number | 190 |
| Rosin acids | 32.0% |
| Fatty acids, total | 66.6% |
| Unsapcnifiables | 1.4% |

*Interested?* Write today for samples and quotation.

**Producers of:**
ACINTOL C Crude Tall Oil
ACINTOL D & DLR Distilled Tall Oil
ACINTOL P Tall Oil Pitch
ACINTOL R Tall Oil Rosin
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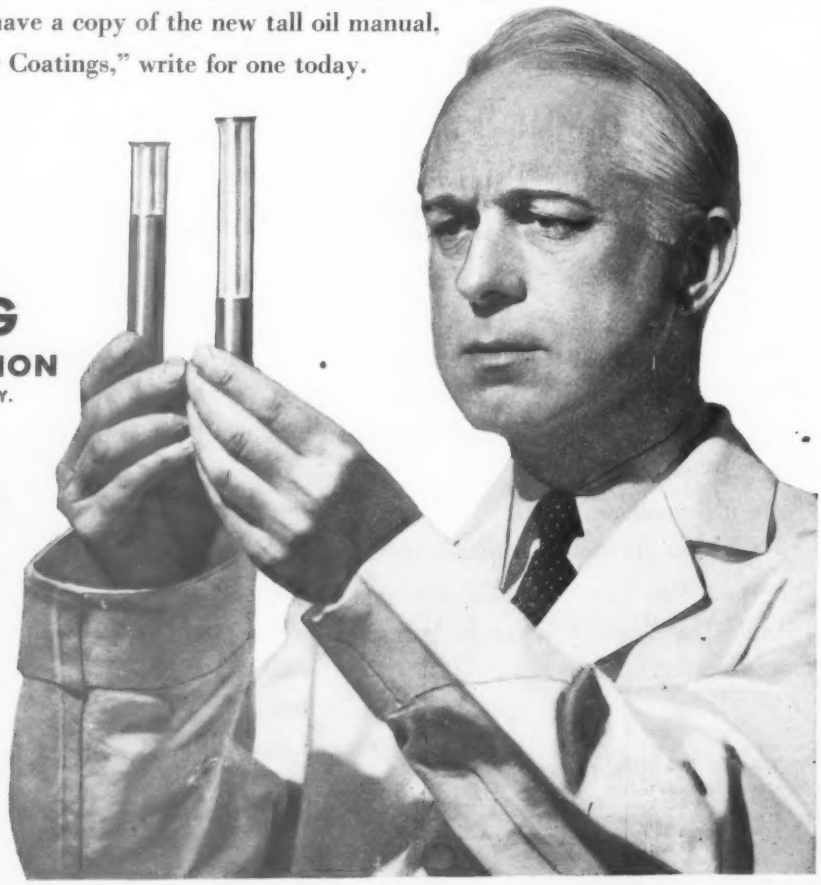
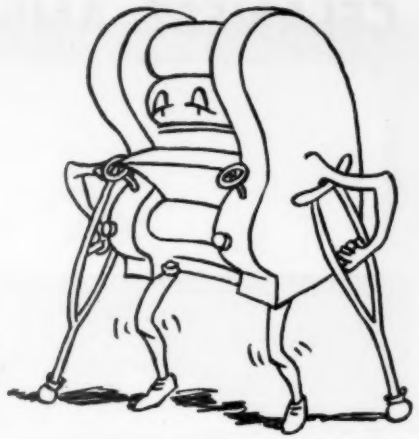
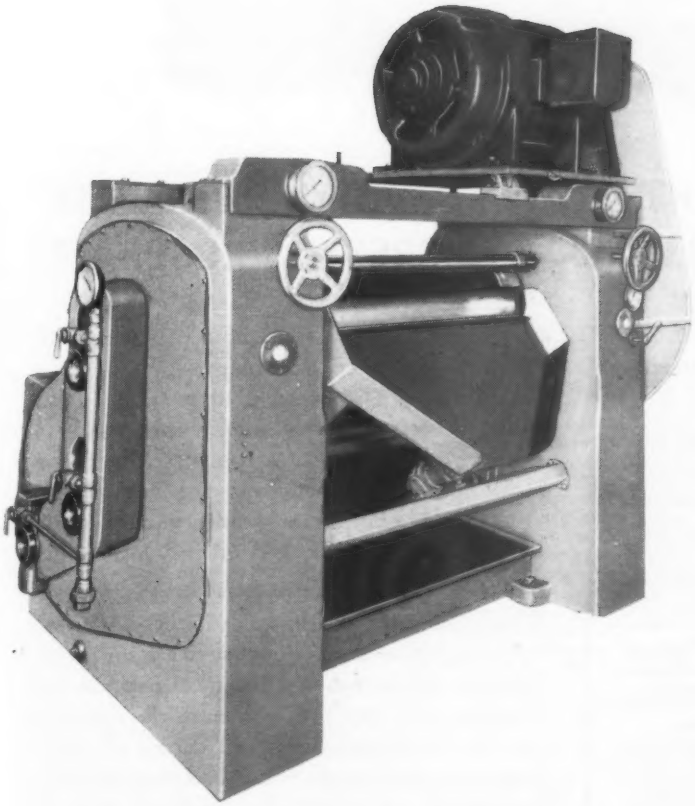


# Is it smart management to wear out production machinery ?





Lehmann Model 631-V Three Roll Paint Mill, one of a full range of sizes, with Sight-O-Matic Control.

WHEN should production machinery be replaced? Should a manufacturer continue to operate obsolete equipment, "come hell or high water"? What happens to the competitive position of a company that adheres to such a policy while alert competitors meantime are reaping the advantages of technological progress by reducing operating costs with newer models?

These questions have particular significance in the period we are now entering, which promises to be a long-term buyers' market. If you have not yet investigated the advantages of the new Lehmann Three Roll Paint Mills with **Sight-O-Matic*** Control, this is certainly the time to do so. Improved results are consistently obtained over a wide range of formulations. Even a fair operator will produce excellent results — a skilled man will really surprise you.

And remember, Lehmann manufactures a complete roller mill line in a full range of sizes from laboratory equipment to high production models such as the 631-V illustrated here, all available with **Sight-O-Matic** Control.

If you wish to improve your position in today's competitive markets — investigate the advantages of these better roller mills in reducing production costs.

*Reg. U. S. Pat. Off.

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First to commercially produce Tricresyl Phosphate, Celanese now has these new plasticizers under the same rigid control standards that established Celanese Celluflex and Lindol as the most efficient, most widely used plasticizers for electrical insulation and many other applications. Celanese Di-Butyl Phthalate and Di-Octyl Phthalate deliver the consistent uniformity of characteristics that assure top plastic performance. Both new plasticizers are immediately available in compartmented tankcars, tankwagons or drums from conveniently located distribution centers.

When you are discussing plasticizers with your Celanese representative be sure to ask him about Celanese *comprehensive* Technical Service. The Celanese resin application laboratories can assist you in new formulations and choice of plasticizers. For samples, prices and complete technical data, write: Celanese Corporation of America, Chemical Division, Dept. 558C, 180 Madison Avenue, New York 16, N. Y.

**CELANESE SPECIFICATIONS**

| Specifications | Tricresyl Phosphate Lindol* Celluflex* | Di-Octyl Phthalate | Di-Butyl Phthalate |
|---|---|---|---|
| Appearance | Clear Transparent | Clear Transparent | Clear Transparent |
| Color, A.P.H.A.†, Max. | Lindol—75 Celluflex—150 | 50 | 50 |
| Acidity, %, max. | as Phosphoric 0.01 | as Phthalic 0.01 | as Phthalic 0.01 |
| Moisture, %, max. | 0.1 | 0.1 | 0.1 |
| Ester Content, %, min. | 99 | 98 | 98 |
| Specific Gravity @ 20/20° C. | 1.165±.005 | 0.986±.002 | 1.045±.001 |
| Odor | none | slight | slight |

†American Public Health Association Standard

Celanese* CHEMICALS

*Reg. U. S. Pat. Off.

# Developments In The Paint Industry For 1952

## PART III

By GEORGE S. COOK

This is the third and concluding installment of our annual review article, "Developments in the Paint Industry." Part I appeared in the January issue and covered such important subjects as the business and government pictures, products of the paint industry, and important developments in oils, fatty acids, and waxes. Part II appeared in the February issue and dealt with last year's developments in chemical intermediates, resins and polymers of all types, technological advancements in lacquers, solvents and plasticizers.

This article covers the fiscal period of Nov. 1, 1951-Oct. 30, 1952.

### Pigments

#### Technical Information

17.1.1. Gough (141) reports on studies on the performance characteristics of orange pigments as follows:

1. C. P. medium chrome orange has good color retention; mass tone darkens somewhat; color of tints slowly decrease by fading; gloss gradually decreases with age but is one of the better pigments for gloss retention.

2. C. P. molybdate orange darkens more than chrome orange in the mass tone; in the tint it shows darkening along with fading; gloss retention is best of the series.

3. Benzidine orange tone has fairly good color retention in the mass tone; fades rapidly in tints; gloss retention is fair; considerable chalking in Florida exposed tint.

4. Dinitraniline orange tone is one of the better oranges for color retention in the mass tone; good color retention in tints; gloss retention is poor; slight chalk in tints.

5. Hansa orange toner has excellent color retention in mass tone; best color retention in tints; gloss retention fair; considerable chalking.

6. Dianisidine orange toner has very good color retention in mass tone; color retention falls off rapidly in tints; gloss retention is fair; considerable chalking.

7. Cadmium lithopone light red varied in color retention with exposure conditions; poor gloss retentions; considerable chalking.

8. Antimony pentasulphide is a complete failure as a paint pigment.

17.1.2. Killian (230) summarizes the types and properties of various pigments used in automotive finishes. Donohue (231) reviews the advancements made in color pigment development.

17.1.3. Dunn (222) reports on studies with a phase microscope, the transmitted light microscope, the X-Ray, micro X-Ray and electron diffraction patterns in addition to chemical tests to learn something of the character of the surface of basic silicate white lead.

17.1.4. McDowell and Clark (331) sought to provide the ink and coatings industries with a dry pigment chip which could be stored indefinitely and then dissolved in suitable solvents without mill grinding to form finished composition. The resinated-type source of color has been prepared by fusion of zein and pigment. Solutions of these friable color chips are lower in viscosity and retain initial viscosity better than conventional zein inks prepared by ball milling the pigment and protein in volatile solvents, or by 3-roll paint milling in glycols. Coatings and prints from the solutions are also glossier and more transparent. These improved properties appear to result from finer disintegration of the pigment particles or from closer association of the pigment with the protein. By the method described, it is now possible to produce zein pigment chips which will readily

dissolve in glycol and alcohol solvents and disperse in water. Such pigment-resin combinations are of interest to both the manufacturer and consumer of pigments. In particular, these compositions are of significance to producers of aniline, steam-set, and heat-set printing inks, to color coaters of paper, paperboard, glassine, and cellophane, and to companies that require pigmented colors rather than dyes because of the generally higher resistances of pigments.

17.1.5. Wormald and Spengeman (351) classified synthetic colored pigments according to their chemical type and identified them with respect to their characteristic behavior in plasticized polyvinyl chloride resin systems. Synthetic colored pigments may be broadly classified as either organic or inorganic. The inorganic pigments are usually more stable to heat and to light and superior in bleed and migration resistance as compared to the organic pigments. Among the organic pigments, phthlocyanine blue and green afford outstanding pigment properties. Precipitated azo pigments are usually superior in bleed and migration resistance and frequently superior in heat and light stability as compared to azo pigment dyes. Metal constituents of the pigment — e. g. lead, iron, zinc, and manganese — may be responsible for discoloration in the presence of sulfides (lead-containing pigments), rapid heat or light degradation (iron- and zinc-containing pigments), or rancidity in the final product (manganese or other oxidation catalyst-containing pigments).

17.1.6. Nace and Walker (453) studied the loss of drying on aging of printing inks containing alumina hydrate lake pigments. They found that the loss of dry increased with increasing acidity and moisture content of the pigments. It is also severe in the presence of Turkey red oil and lakes containing excessive dye. The loss of dry is attributed to absorption of the cobalt onto the pigments where it no longer exerts its catalytic effect. Two absorption mechanisms are suggested for different lake pigments: One involves the extraction of cobalt into the acidic water film surrounding the pigment particles and the other involves reaction of the cobalt with oil-soluble organic acids where these are present. A cobalt absorption test has been developed to distinguish those alumina hydrate lakes which are likely to produce loss of drying on aging. On the basis of these mechanisms there are several things that can be done by the pigment supplier and the ink maker to reduce the difficulties from loss of drying with lakes. The pigment producer can avoid free sulfonic acids and excessive acidity in his lakes and can ship the lakes in moisture-proof containers. The ink maker can avoid the troublesome pigments by use of the adsorption test. Furthermore, he can protect his stock from moisture and dry his pigments where tests show it to be helpful and economical. If necessary, he can use corrective agents to combat loss of drying on aging with lakes.

17.1.7. An ultramarine blue pigment that possesses twice the coloring power of previous commercial products has been developed. (486) Ultramarine blue is a crystalline pigment containing sulfur, aluminum and silicon compounds. It is ordinarily made by heating a mixture of clay, sulfur, carbon and soda ash followed by another heat treatment with air and more sulfur. Using zeolites in place of the conventional clay and soda ash in the manufacturing process enables the higher color value blue to be obtained.

17.1.8. Shearon et al (344) describe the production process of HAF carbon black. Efficiencies as high as 60% are attained by the process compared with 25-50% in furnace plants using natural gas alone and 5-10% in channel black plants.

17.1.9. Kumins (126) prepares a transparent cadmium sulfide pigment by reacting a solution of a water soluble cadmium salt with a solution of water soluble alkali sulfide, separating the precipitated cadmium sulfide and transferring the pigment to a hydrophobic vehicle.

17.1.10. O'Brien (120) makes an improved sulfidic pigment by: reacting a metal sulfide with a water-soluble salt of calcium or magnesium to precipitate the insoluble calcium or magnesium hydrate; removing the hydrate; stricking the mother liquor with an aqueous solution of a water-soluble salt of at least one metallic pigment to produce a sulfidic precipitate of the said pigment; and separating the sulfidic precipitate from the solution.

17.1.11. Dewitt et al (343) present pilot plant data for the production of red, brown, black and yellow iron oxides. Continuous operation was shown to possess cost and operating advantages over batch process. Design studies on a commercial plant indicate the process to be economically feasible for the use of the various pickle liquor wastes produced in iron or steel processing.

17.1.12. Kebrich (99) manufactures a litharge free red lead by adding chromic acid to a water slurry of red lead. The precipitated lead chromate is removed by filtration.

17.1.13. Jennings (2) developed a process of making colors by reacting two compounds in equimolecular proportions. The compounds being a monohydric phenol and a compound of the general formula:

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$ROCH_2NH\text{-}R_2\text{-}NHCH_2OR_1$

with the reaction carried out at a temperature of 0 to 50 C in the presence of a water-miscible alkanol and a mineral acid condensation catalyst.

17.1.14. Kronstein et al (197) examined platy mica extenders versus other extenders and found that:

1. The use of mica aids the salt-fog and moisture resistance of the dried paint film.
2. The optimum content of mica varies depending upon the other pigments used in the paint.
3. With high mica contents, the films became porous.

17.1.15. Edwards (81) makes an aluminum paste pigment formulation comprising a main body of leafing aluminum flakes, mineral spirits and at least one leafing agent that was added at least in part in solid phase with the paste polished for a period of 1 to 12 hours. Roberts (69) prepares a water-emulsifiable metallic paste pigment formulation comprising 23 to 45% metal flake, 3 to 12% volatile hydrocarbon, at least one fatty acid in admixture with tall oil, at least one water-soluble soap forming emulsifier and a stabilizer. Stolz and Vaught (106) developed a solvent thinned metallic ornamental paint containing a bituminous binder with coumarone-indene resin, solvent, aluminum powder, and an asbestos filler.

**New Pigments**

17.2.1. ALUMINUM COMPANY of AMERICA. Aluminum Tinting Paste No. 222 is said to impart greater two-tone, flash and glamor for polychrome or metallic finishes. Metal content is 65%, weight per solid gallon is 12.245 pounds and it has a bulking value of 0.0820 gal. per pound.

17.2.2. CALCO CHEMICAL DIVISION. Calcopad Pastes is a line of aqueous dispersions of carefully selected pigments designed especially for padding on to fabrics in combination with oil-in-water emulsions of resins. Since the pigments were chosen because of their resistance to light fading, these dispersions are well suited for the producing of pastel shades. These pastes are also compatible with aqueous resins of the urea and melamine-formaldehyde types.

17.2.3. ANSBACHER-SIEGLE CORP. Richmond and Fastolux Greens, Fastolux Blues, Toluidine Red and Permanent Yellow pastes are a line of color dispersions for latex emulsion paints. The manufacturer states that these dispersions have been checked for compatibility with various copolymer latex paint-systems, and have proven satisfactory in all cases.

17.2.4. BINNEY & SMITH. Aqua Blacks are stable colloidal aqueous dispersion containing carbon black ready for use without additional milling and can be added to latex systems with simple agitation. Aquablack M contains a furnace black with the characteristic blue tone of lampblack.

17.2.5. CARBON DISPERSIONS, INC. Black Shield Double-*X* is recommended as a tinting black with minimum flooding for a wide variety of paints.

17.2.6. GODFREY L. CABOT, INC. Sterling V and Sterling V-12 are oil furnace black pigments with superb color strength, ease of dispersion, blue tone and stability in tints. Sterling V is pelletized and the Sterling V-12 is fluffy. Calcium metasilicate, known as Wallastonite, is a mineral which has remarkable physical and chemical uniformity. It is fibrous in nature and has potentialities as a pigment extender, a paper coating pigment, and as a filler in asphalt tile and plastics. Four commercial grades are being produced: A P-1 grade for the paint trade, C-1 for the ceramic industries; and two fiber grades, F-1 and F-2.

17.2.7. MEARL CORP. Nacromer is a simulated substitute for pearl essence which may be mixed with paint or lacquer and applied by dip or spray to most any surface.

17.2.8. METALEAD PRODUCTS CORP. Flaked Metallic Lead is a bronze powder type of metallic lead, containing less than 1% stearic acid and stearates. Special formulations show the coatings resist chemical corrosion conditions.

17.2.9. MONSANTO CHEMICAL CO. Syton C-30 possesses a weak negative charge which, coupled with the large surface area and reactive nature of the surface, accounts for the binding effect that this material exhibits in certain systems. Spherical shape of the unit colloidal particle accounts for the low viscosity of relatively concentrated solutions and for the properties it imparts to paper and other materials. The material lends excellent skid resistance, and high gloss to aqueous waxes, decreases tack and controls gloss in water based finishes, aids suspension of pigments in aqueous systems.

17.2.10. MUTUAL CHEMICAL CO. of AMERICA. Sodium Copper Chromate, Basic is slightly soluble in water with partial hydrolysis; finely crystalline purplish brown powder. Suggested as anticorrosion and antifouling pigment for marine paints. May possess mildew-inhibiting and fungicidal properties.

17.2.11. NATIONAL LEAD CO. Chromic Phosphate is a fine, bluish-green amorphous powder. Suggested as a metal protective pigment in new single-package vinyl wash primer applications, for protection of steel against fresh water, salt fog, and for protection of aluminum and galvanized iron. Dutch Boy Bentone Blue is an organic compound of mon-morillonite. Useful as a blue pigment. Gives a reddish undertone when used as a blue colorant in vinyls and other film and sheeting resins. Predispersed paste for easy incorporation, resists staining and bleeding, very stable to heat and light.

17.2.12. TITANIUM PIGMENT CORP. Titanox C-50 contains 50% rutile $TiO_2$ and 50% calcium sulphate extender. Has intermediate hiding between Titanox-RA and Titanox RC-HT. To be useful in the semi-gloss range and in certain flats where it is desired to lower pigment volume but maintain hiding.

17.2.13. WHITTAKER CLARK and DANIELS, INC. Aquamarine Blue is a 20% blue in paste form dispersed in water and contains a dispersing agent. Synthaline Blue #1950 is a dry blue, non-dusting, non-crystallizing, easy to grind, easy dispersion, low oil absorption. Synthaline Blue Flushed #1949 has a soft body, easy dispersion in paint vehicles with no milling required.

**Technical Bulletins**

17.3.1. CALCO CHEMICAL DIVISION. Phthalocyanine Blue, a 11-page pamphlet includes charts, diagrams, and microphotographs.

17.3.2. ANSBACHER-SIEGLE CORP. Important Notes on Colors for Latex Emulsion Paints discusses some important factors regarding the selection of color pigments for use in latex paints.

17.3.3. FERRO ENAMEL CORP. A folder describes colors sold in powder form to be used to coat plastisol and organosol resins. Describes manufacture and available colors.

17.3.4. GODFREY L. CABOT, INC. Carbon Black Pigments gives a complete list of the firm's line of carbon black pigments.

17.3.5. HARWICK STANDARD CHEMICAL CO. Clays in Paint, a 6-page bulletin discusses the use of clay in paint. Physical and chemical properties together with chemical and screen analysis are included.

17.3.6. LEAD INDUSTRIES ASSOCIATION. Lead Outlook, a leaflet which tells why consumers may depend on adequate supplies of lead in the future. White Lead in Mixed Pigment House Paints, a 16-page booklet that tells why white lead is vitally needed in house paints as a stabilizer, plasticizer, strengthener, water resistor and means of improving appearance. The booklet is supplemented by a technical bulletin containing five primer and eight finish paint formulations. A variety of mixed pigment formula types are included to meet a range of geographical marketing and other requirements. Red Lead Technical Letter No. 6 contains for-

mulations that have been found to give outstanding protection to ferrous surfaces under many types of service conditions. Included are formulations for use under ordinary atmospheric conditions, severe atmospheric conditions, tidewater, submerged exposures in both fresh and salt water.

17.3.7. METALS DISINTEGRATING CO., INC. Bulletin 513 describes MD 565 W Aluminum Paste and its use in the pigmentation of aluminum paints.

17.3.8. PEERLESS PRINTING INK CO. Brochure describes concentrated carbon black dispersions in a variety of plasticizers and solid resins. Technical data and formulations of the product are covered with suggested application of each dispersion.

17.3.9. R-B-H DISPERSIONS. Properties and uses of carbon black dispersions in various vehicles are discussed in circular.

17.3.10. REYNOLDS METALS CO. An 84 page manual covers the familiar uses of powdered aluminum in aluminum paints, irridescent auto finishes, roof coatings and also unique applications such as chemical reactions which provide heat without flame, sea markers, bombs with doubled destructive power, powder metallurgy, etc.

17.3.11. RHODE ISLAND LABORATORIES: Properties of various phosphorescent and fluorescent pigments including color, afterglow, fluorescence, specific gravity, etc. are given.

17.3.12. WET GROUND MICA ASSOCIATION. Bulletin #9 covers an Investigation of the Effect of the Behavior of Vinyl-Alkyd Paints. Report gives results of tests on one of those paints in which mica had been used in varying amounts.

## Other Paint Materials

### Driers

18.1.1. Ware (458) prepared a bibliography on driers covering the period of Jan. 1930 to Jan. 1952. Included in this literature survey are articles concerned with the following phases of driers: 1. General, 2. The Mechanics of Drying, 3. Loss of Drying Power, 4. Analysis, 5. Driers-Metal, 6. Driers-Acid, 7. Miscellaneous, and 8. Hazards.

18.1.2. Lawrence and St. Clair (25a) fuse modified rosins with a metal compound to produce neutral, permanently fusible resinates of high metal content. These metal resinates are useful in protective coatings, as driers for unsaturated vegetable oils, as preservatives for wood and as wetting and dispersing agents.

18.1.3. ADVANCE SOLVENTS and CHEMICAL CORP. made available Soligen Rare Earth Napthenate 4% as a catalyst primarily recommended for promoting cross-linking polymerization at elevated temperatures. Application for this material are as drier catalyst in baked finishes which are based on pure epoxy resins or combinations of epoxy, urea, melamine or alkyd resins. This drier aids in increasing the molecular cross linking of heat reactive resins, resulting in increased hardness and toughness of the film. Zirco Drier Catalyst is a zirconium chemical complex in mineral spirits solution and contains 6% zirconium metal. In combination with other metallic driers it enables harder films, better gloss and improved adhesion with equal drying speed to be obtained.

18.1.4. HARSHAW CHEMICAL CO. A 31-page booklet contains complete information on physical and chemical properties of all types of driers offered by Harshaw. The data has been compiled with the idea of giving the technical men working with drying oils and resins practical information on the selection and use of driers.

18.1.5. NUODEX PRODUCTS CO., INC. Odorex are driers specially formulated for use in resin and oil base odorless paints. Nuolate Lead 24% has overcome the crystallization or solidification of lead tallate driers at freezing temperatures. It is reported to retain its flow at 30° below zero. Calcium as an auxiliary drier for paints and varnishes is covered in a 4-page folder. Specific recommendations for the use of calcium in vehicles showing poor tolerance in fume-proof coatings, in sanitary coatings, in maleic treated oils, and in penta alkyds are given. A section discusses how calcium can help cut top drier usage and yet maintain drying characteristics.

18.1.6. CADET CHEMICAL CORP. Benzoyl Peroxide Catalyst 35 contains 35% benzoyl peroxide with inert filler. Specially designed for use in the silicone rubber and plastics industry.

18.1.7. MONSANTO CHEMICAL CO. Trisilver Orthophosphate is a brilliant yellow powder, insoluble in water and common organic solvents. Useful as a catalyst.

### Fungus and Mildewproofing Agents

18.2.1. Block (477) presents an overall review on chemicals for fungus control including metallic, phenolic, and organic derivatives of nitrogen and sulfur as fungus control agents.

18.2.2. Sward (457) describes the various types of mildew and illustrates their adverse affects on paint by photographs of dwellings so attacked. Methods of combatting mildew are described.

18.2.3. Goll and Hyde (232) describe the influences of paint formulation on mildew. Zinc oxide is an active mildew inhibitor. Calcium carbonate, silica and magnesium silicate assist in resisting mildew. Tung oil is the most resistant oil whereas soya and fish oils with out driers are most susceptible to mildew. Hard synthetic resins are largely inert to fungal activity. Goll, et al (153) describes how a microscope equipped with a vertical illuminator, and a stereoscopic microscope permits the identification of many types of mildew right from the paint sample in question.

18.2.4. DIANOL SALES CORP: Dichlorodiphenyl Dichlorethane is mixed with inactive material and sold for mixing with paint before application. The insecticide does not dissolve but becomes suspended in paint and retains its effectiveness for four to five years.

18.2.5. FERRO CHEMICAL CORP. Fungicides are covered in a 33-page booklet on copper naphthenate, copper 8-quinolinolate, phenyl mercury salt, zinc napthenate. Active metal content, percent solids, flash point, volatile solvent, and viscosity are given. Each fungicide is discussed covering test methods for determining resistance to fungal attack, crocking, flexibility, percent loss on leaching, determination of metal and nonvolatile matter.

18.2.6. NAFTONE, INC. issued a booklet discussing in detail two naphthenates to protect cellulosic materials against mildew, rot and fungus.

18.2.7. NOPCO CHEMICAL CO. Agrimul PC is a balanced neutral emulsifier for pentachlorophenol. This liquid will mix clear with solvent solutions of pentachlorophenol at various concentrations.

18.2.8. WITCO CHEMICAL CO. issued a 12-page Technical Service Report on Mildewproofing Agents with emphasis on 8% copper naphthenate and other chemicals with respect to Government Specifications. A brief description of the methods used for mildewproofing materials and some of the products used for this purpose, with abstracts of many of the government specifications on mildewproofing requirements is given.

### Metallic Soaps

18.3.1. Parker and Wendt (162) studied 15 metallic stearates, Table XVII, for effective use as flatting agents in one standard lacquer. They conclude:

1. Di-aluminum, calcium, lead, lithium and zinc stearates are the most efficient flatting agents.
2. The aluminum di-stearate has the greatest transparency and best rubbing characteristics.
3. Ease of sanding of the calcium, lithium, and zinc stear-

| Stearate | Type | Manufacturing Method | Cons. | Gloss | Rubbed Gloss | Apparent Reflectance |
|---|---|---|---|---|---|---|
| Aluminum | Mono | Precipitation | 56 | 41 | 70 | .291 |
| " | D1 | " | 64 | 34 | 72 | .284 |
| " | | " | 70 | 54 | 64 | .253 |
| Barium | Normal | " | 54 | 57 | 61 | .335 |
| Cadmium | " | " | 57 | 46 | 59 | .300 |
| Calcium | " | " | 49 | 32 | 59 | .408 |
| Copper | Cupric, D1 | " | 56 | 46 | 55 | — |
| Iron | Ferric, D1 | " | 47 | 80 | 65 | — |
| Lead | Normal | " | 49 | 33 | 56 | .336 |
| Lithium | " | " | 74 | 30 | 47 | .364 |
| " | " | Fusion | 55 | 29 | 51 | .362 |
| Magnesium | " | Prev. | 59 | 43 | 58 | .388 |
| Manganese | Manganous, D1 | " | 47 | 46 | 64 | — |
| Sodium | Normal | Fusion | 75 | 50 | 58 | .365 |
| Zinc | " | Precipitation | 79 | 23 | 60 | .390 |
| Gloss Lacquer | — | — | — | 96 | — | .174 |

Table XVII. Metallic stearates as flatting agents in lacquer.

ates make them suitable for sanding sealers.

4. The excellent suspension properties, flatting efficiency, and sanding ease of lithium stearate warrants consideration.

18.3.2. Young (211) rates performance of various flatting agents as shown in Table XVIII.

18.3.3. Stumph (271) shows that:

1. Aluminum octoate produces the most stable, high yield gels in a variety of solvents than other aluminum soaps.

2. Aluminum octoate has application as a varnish drier.

3. Aluminum oleate is more economical to manufacture and can be used where a moderate yield gel is desired.

4. Gels produced with aluminum stearate, laurate, myristate, and palmitate do not remain stable after aging.

5. The strength of any gel depends upon the solvent used and the type of aluminum soap with which it will react.

6. To obtain stable and uniform gels, it is necessary to determine what aluminum soap should be used with the specified solvent.

18.3.4. Weidlich (22) developed a coating that dries to a transparent dull or matte surface by the incorporation of pigment size particles of a metal soap consisting of aluminum, zinc, magnesium, or alkaline earth metal salt of an adduct of an alpha beta unsaturated dibasic acid with a terpene and coated with a film deposited from an aqueous solution of methyl cellulose.

18.3.5. AMERICAN CYANAMID CO. issued a data sheet on "Cyanamide Aluminum and Calcium Stearates as Pigment Suspending Agents in Flat Wall Paints." Aluminum and calcium stearates are compared for: fineness of grind; Viscosity before and after grinding; viscosity after storage; viscosity increases, settling after storage, gelation, brushing characteristics.

18.3.6. METASAP CHEMICAL CO. issued a booklet on metallic soaps, covering uses, properties, analysis and references.

**Surface-Active Agents**

18.4.1. Gardner (204) classifies surface active agents as: cationic, anionic and non-ionic. The anionic group may be subdivided into:

1. Soaps, alkali or metallic.

2. Sulfated compounds, sulfated aliphatic esters or aliphatic sulfates (sulfated alcohols).

3. Sulfonated compounds, aliphatic sulfonates or alkyl and aryl sulfonates.

4. Organic amine fatty acids.

The amino compounds are more stable, less hydrophilic and more soluble in non-aqueous solvents but calcium and magnesium tolerances are poor. The aliphatic sulfonates are among the best of the emulsifying agents. They are resistant to acids, alkalies, electrolytes and have good calcium tolerance. The non-ionic surface-active agents are the esters or ethers of fatty acids of 12 to 18 carbon atoms. These agents are independent of any degree of ionization of a polar group for attaining a suitable balance between hydrophilic and hydrophobic groups and are less affected by high concentrations. They are completely calcium tolerant and have a greater range of compatibility with solvents and chemicals than the anionic or cationic agents. The cationic-active agents include the quaternary ammonium derivatives of which the most effective are trimethyl cetyl ammonium

Table XVIII. Performance of various flatting agents.

| | Synthetic Silica | Natural Occurring Products | Natural Occurring Products Plus Organic Surface Coatings | Metallic Soaps |
|---|---|---|---|---|
| Economic Efficiency | 1 | 1 | 2 | 3 |
| Flatting Efficiency | 1 | 4 | 2 | 3 |
| Grinding Time | 1 | 2 | 1 | 1 |
| Film Clarity | 1 | 2 | 3 | 3 |
| Temperature Stability | 1 | 1 | 2 | 3 |
| Resistance to Burnish | 1 | 2 | 3 | 3 |
| Settling Characteristics | 2 | 2 | 2 | 1 |
| Mill Base Concentrations and Stability | 1 | 1 | 2 | 3 |
| Uniformity and Purity of Product | 1 | 3 | 3 | 2 |

chloride, methyl cetyl piperidinium chloride and ceytl piridinium chloride. Storage stability may be affected by too good of a dispersion. Also livering or gelation may result. These troubles may be corrected by addition of: free acid resins and acids; amines capable of forming salts with acids; ethyl or butyl alcohol. The reactivity of surface active agents with pigments and vehicles must be checked experimentally. Livering, pigment settling, foaming, dullness, loss of color brilliance, are all possible difficulties.

18.4.2. Hedrick et al (334) developed a new class of surface active agents — alkyl esters of substituted aroyl sulfopropionic acids — synthesized by a Friedel-Crafts acylation of the appropriate aromatic compound with maleic anhydride esterification of the resulting arylacrylic acid and subsequent treatment of the resulting ester with an alkali bisulfite to yield surface-active agents that show promise as wetting agents and detergents.

18.4.3. Daniel (187) describes how mixing and grinding aids in conjunction with proper formulation will improve production speed as well as finished paint products.

18.4.4. Shur (142) reports on an evaluation of anti-flood and float compounds:

1. Methyl silicones in a wide range of viscosities are effective agents for reducing the floating of many paint systems.
2. Increasing the size or number of organic groups in a silicone reduces the effectiveness of the silicone as an anti-float agent.
3. No silicone tested had any observable effect on flooding.
4. The silicones apparently act by concentrating at the air-interface of the film and reduces surface tension. They may, therefore, be considered surface agents which are active in organic media.
5. No evidence was found that the silicones were active at the pigment-vehicle interface.

18.4.5. DOW CORNING CORP: describes the properties and uses of its 200 Fluid as an anti-float agent in a 32-page booklet.

18.4.6. COMMERCIAL SOLVENTS CORP: and OHIO-APEX, INC. both have tributyl phosphate available as an anti-foam agent for use in paints, water soluble adhesives, inks, casein solutions and rubber latex.

18.4.7. GRIFFIN has found Tenlo 70, a non-ionic modified poly-amide and polyhydric alcohol esters to act as an anti-sag agent. This oil-soluble wetting agent when used at 3-7 lbs. per 100 gals. of paint reduces sagging characteristics.

18.4.8. AMERICAN CYANAMID CO: Aerosol SE is a surface active agent that is stable, re-wetting and surface tension lowering properties. It is a quaternary ammonium compound — a 50% solution of stearamidopropyldimethyl-B-hydroxyethylammonium chloride in an isopropanol-water mixture.

| Metal | Environment | Inhibitor |
|---|---|---|
| Admiralty | Ammonia, 5% | 0.5% hydrofluoric acid |
| Aluminum | Acid hydrochloric, 1N | 0.003 M $\alpha$ phenylacridine, $\beta$ naphthoquinone, acridine, thiourea or 2-phenylquinoline |
| Aluminum | Acid nitric, 2–5% | 0.05% hexamethylene tetramine |
| Aluminum | Acid nitric, 10% | 0.1% hexamethylene tetramine |
| Aluminum | Acid nitric, 10% | 0.1% alkali chromate |
| Aluminum | Acid nitric, 20% | 0.5% hexamethylene tetramine |
| Aluminum | Acid phosphoric | Alkali chromates |
| Aluminum | Acid phosphoric, 20% | 0.5% sodium chromate |
| Aluminum | Acid phosphoric, 20–80% | 1.0% sodium chromate |
| Aluminum | Acid sulphuric, conc | 5.0% sodium chromate |
| Aluminum | Alcohol anti-freeze | Sodium nitrite & sodium molybdate |
| Aluminum | Bromine water | Sodium silicate |
| Aluminum | Bromoform | Amines |
| Aluminum | Carbon tetrachloride | 0.05% formamide |
| Aluminum | Chlorine water | Sodium silicate |
| Aluminum | Calcium chloride, sat | Alkali silicates |
| Aluminum | Ethanol, hot | Potassium dichromate |
| Aluminum | Ethanol, commercial | 0.03% alkali carbonates, lactates, acetates or borates |
| Aluminum | Ethylene glycol | Sodium tungstate or sodium molybdate |
| Aluminum | Ethylene glycol | Alkali borates & phosphates |
| Aluminum | Ethylene glycol | 0.01–1.0% sodium nitrate |
| Aluminum | Hydrogen peroxide | Sodium metasilicate |
| Aluminum | Methyl alcohol | Sodium chlorate plus sodium nitrite |
| Aluminum | Methyl chloride | Water |
| Aluminum | Sodium hydroxide, 1% | Alkali silicates |
| Aluminum | Sodium hydroxide, 1% | 3–4% potassium permanganate |
| Aluminum | Sodium hydroxide, 4% | 18% glucose |
| Aluminum | Sodium acetate | Alkali silicates |
| Aluminum | Sodium chloride, 3.5% | 1% sodium chromate |
| Aluminum | Sodium carbonate, 1% | 0.2% sodium silicate |
| Aluminum | Sodium carbonate, 10% | 0.05% sodium silicate |
| Aluminum | Sodium sulphide | Sulphur |
| Aluminum | Sodium sulphide | 1% sodium metasilicate |
| Aluminum | Tetrahydrofurfuryl alcohol | 1% sodium nitrate or 0.3% sodium chromate |
| Aluminum | Triethanolamine | 1% sodium metasilicate |
| Copper & brass | Acid sulphuric, dil | Benzyl thiocyanate |
| Copper & brass | Ethylene glycol | Alkali borates & phosphates |
| Copper & brass | Polyhdric alcohol anti-freeze | 0.4–1.6% $Na_3PO_4$ plus 0.3–0.6% sodium silicate plus 0.2–0.6% sodium mercaptobenzothiazole |
| Copper & brass | Rapeseed oil | Succinic acid |
| Copper & brass | Sulphur in benzene solution | 0.2% 9, 10 anthraquinone |
| Copper & brass | Tetrahydrofurfuryl alcohol | 1% sodium nitrate or 0.3% sodium chromate |
| Copper & brass | Water-alcohol | 0.25% benzoic acid, or 0.25% sodium benzoate at a pH of 7.5–10 |
| Magnesium | Alcohol | Alkaline metal sulphides |
| Magnesium | Glycerine | Alkaline metal sulphides |
| Magnesium | Glycol | Alkaline metal sulphides |
| Magnesium | Trichlorethylene | 0.05% formamide |
| Magnesium | Water | 1% potassium dichromate |
| Monel | Sodium chloride, 0.1% | 0.1% sodium nitrite |
| Monel | Tap water | 0.1% sodium nitrite |
| Stainless steel | Acid sulphuric, 2.5% | 5–20 ppm. $CaSO_4.5H_2O$ |
| Stainless steel | Cyanamide | 50–500 ppm. ammonium phosphate |
| Steel | Acid citric | Cadmium salts |
| Steel | Acid sulphuric, dil | Aromatic amines |
| Steel | Acid sulphuric, 60–70% | Arsenic |
| Steel | Acid sulphuric, 80% | 2% boron trifluoride |
| Steel | Ethylene glycol | Alkali borates & phosphates |
| Steel | Ethylene glycol | Guanidine or guanidine carbonate |
| Steel | Ethyl alcohol, 70% | 0.15% ammonium carbonate plus 1% ammonium hydroxide |
| Steel | Isopropanol, 30% | 0.03% sodium nitrite plus 0.015% oleic acid |
| Steel | Sodium chloride, 0.05% | 0.2% sodium nitrite |
| Steel | Sulphide containing brine | Formaldehyde |
| Steel | Tetrahydrofurfuryl alcohol | 1% sodium nitrate or 0.3% sodium chromate |
| Steel | Water | Benzoic acid |
| Steel | Water for flooding operations | Rosin amine |
| Steel | Water saturated hydrocarbons | Sodium nitrite |
| Tin plate | Carbon tetrachloride | 2% mesityl oxide, 0.001% diphenylamine |
| Tin plate | Sodium chloride, 0.05% | 0.2% sodium nitrite |

Table XIX. Corrosion Inhibitor Checklist.

18.4.9. EL DORADO OIL WORKS. Defoamer E D is an amber colored liquid containing some suspended particles. An ester type material of coconut fatty acids. Addition of 0.2-1.0% to rubber latex emulsion paints causes the dissipation of bubbles when paint is applied with a brush or roller.

18.4.10. L. SONNEBORN SONS, INC. Hyponate L-50 is an alkyl aryl oil soluble petroleum sulfonate, oil-free, neutral, salt free. It is useful as an emulsifier and/or emulsion stabilizer.

**Chemicals**

18.5.1. CARBIDE and CARBON CHEMICALS CO. A 16-page catalog for over 300 organic chemicals listing physical properties was issued. A booklet that covers the family of "Organic Chlorine Compounds" describes the 11 organic chlorine compounds that are sold in commercial quantities by the company. Uses, physical properties, specifications, and shipping data are covered in addition to a bibliography that lists the important literature references concerning the compounds. A booklet on "Esters" has also been published which describes the more than 30 esters that are sold by the company.

18.5.2. PITTSBURGH COKE and

CHEMICAL CO. issued a 12-page bulletin listing uses and applications of plasticizers, activated carbons, protective coatings, and agricultural chemicals made by the company.

18.5.2. SHELL CHEMICAL CORP. published an 8-page booklet on their line of organic chemicals.

18.6.1. Brooke (385) lists various suggested corrosion inhibitors for various metals under different environment conditions as illustrated in Table XIX.

18.6.2. Heiberger (205) reviews the developments of radio-active chemistry with emphasis on how these materials can aid the analyst in better understanding what reactions have occurred.

18.6.3. Metcalf (233) describes the processes of producing aromatic compounds from aliphatic petroleum sources by the process of Hydroforming.

18.6.4. An ultra-violet screening agent (22a), 4-benzoyl resorcinol, may be added to paints, waxes and textiles. Transparent plastic films containing 0.1 to 10% of the substance afford good color-fade protection.

18.6.5. Baum and Wynkoop (4) developed a non-running paint remover by making a thixotropic water dispersed product of protein colloid in a paint remover solvent and an organic amine.

18.6.6. FERRO CHEMICAL CORP. issued a revised data book on stabilizers.

18.6.7. HARWICK STANDARD CHEMICAL CO. Stabelan G-1 is a heat and light stabilizer for polyvinyl chloride resins and copolymers. Supplied as a paste it can be readily incorporated during cold or hot milling.

18.6.8. HERCULES POWDER CO. Crude CMC, CMC-CT will be packaged in larger bags to contain a guaranteed minimum of 50 pounds of dry active sodium carboxymethylcellulose.

18.6.9. RAYBO CHEMICAL CO. Raybo 43 is reputed to render industrial finishes unscratchable. In baking finishes, it imparts a glass like, marproof surface.

18.6.10. WITCO CHEMICAL CO. Witco Stabilizer No. 80 is a liquid stabilizer for polyvinyl chloride. Contains 100% active ingredients consisting of barium and cadium soaps in combination with a synergistic stabilizer. Witco methycyclohexyl stearate is covered in a technical service report, E-2. This product is a clear, straw-yellow, oily liquid which solidifies at temperatures below 10 C., and is relatively non-volatile. It is used as a plasticizer for rubber and chlorinated rubber as well as a sweller for both crude and vulcanized rubber. It improves gloss of cellulose nitrate or acetate formulations made with a solvent type plasticizer. It is a solvent for ester gum, dammar, coumarone, and cyclohexanone resins.

18.6.11. G. S. ZIEGLER & CO. issued a booklet on the properties and uses of gilsonite, natural asphalt, stearing, pitch, cottonseed pitch, asphalt solutions, waxes, fatty acids, polyamide resins, soybean oil, allyl starch, etc.

18.6.12. PROTECTIVE CREAMS: Boyer-Campbell Co. has a oil repellent cream to protect the skin from oils, solvents, and other water-insoluble liquids causing skin irritation. They also have a waterless cleaner to remove dirt, paints, asphalt, and other industrial compounds. The WEST DISINFECTING CO. marketed creams containing hexachlorophene that aids in the inhibition against staphylococcus aureus. Available in an oil-resistant, #211; a water resistant, #311; and, a solvent-resistant, #411, form.

## Metal Preparation

### Technical Information

19.1.1. Uhlig (188) reviews the factors that affect a metal surface. Unsatisfied valence forces at the surface of a metal lead to a state of tension of the surface atoms, and compression of metal underneath. These forces also account for absorbed films of substances bonded to the metal surface in varying degrees. Films with low energies of bonding are so-called physically adsorbed, and with high energies of bonding are said to be chemisorbed. Adsorbed layers account in major part for:

1. Friction and lubrication phenomena.
2. Catalytic activity
3. Passivity and corrosion resistance, particularly of the transition metals.

Whether a substance will physically adsorb or chemisorb, or whether adsorption will occur at all rather than immediate chemical reaction, is related to:

1. specific affinity of the substance for the metal.
2. the activation energy for any reaction in which a new lattice is formed.

Heat of sublimation of the metal plays a part in determining 2, and electron configuration of the metal is important in both 1 and 2. Chemisorption occurs when specific affinity of the substance for the metal is pronounced, accompanied by high activation energy for reaction. With especially strong bonding between adsorbant and metal, surface valence forces are satisfied, and the metal surface is relatively inert chemically. Transition metals with unfilled "d" electron energy bands tend to chemisorb substances more than do the non-transition metals. Hence, the transition metals are active catalytically for many reactions, and are in themselves passive, or constitute the major components of passive alloys like the stainless steels and related corrosion resistant alloys.

19.1.2. Barbian (264) reviews the various chemical pre-treatment methods in use for preparing magnesium surfaces for painting.

19.1.3. Saubestre of the Columbia University's School of Engineering developed a test for detecting the presence of oils, grease and fats on metal surfaces to be tested. Named the "atomizer test", all that is needed is an atomizer, a supply of distilled water, and a source of compressed air at a pressure of nine psi. A panel of metal is hung up dry, then bathed in a spray of distilled water from a two foot distance. From 30 to 45 sec. the spray is shut off and the panel inspected. Where no grease or oil is present, the fine droplets of water coalesce and form a smooth film. The presence of soils, however, causes the droplets to stand out like tiny beads from the greasy surface. The atomizer test has been found to be at least 10 times as sensitive as other methods of examination.

19.1.4. Haxel and Stericker of the Philadelphia Quartz Co. studied the effect of alkaline detergents on magnesium die casting alloys. They found that the complex phosphates commonly used as sequestering agents in cleaners had a detrimental effect on the magnesium alloy. When used both in a soak cleaner and in electrolytic cleaning (cathodic), the tetrapyrophosphate and other polyphosphates caused a discoloration of the alloy and a marked loss of metal. Severe attack was experienced with all cleaners when the alloy was cleaned anodically. The inclusion of proper amounts of sodium metasilicate with the tetrapyrophosphate eliminated all attack upon the metal.

19.1.5. Chemical pretreatments are reviewed (467). One of the expanding areas of application for chemical pretreatment of metal is that of cold forming. The phosphate coating absorbs oil which permits steel to be extruded and formed while cold.

19.1.6. The market for degreasing solvents is estimated at 10 million gallons per year (493).

19.1.7. Rice (466) in a study on methods of cleaning steel test panels learned:

1. Panels should not be sanded or abraded, either partially or totally, because of changes in the blistering and rusting that occurs as a result of such sanding.

2. Two basic cleaning methods for removal of oil and smut are

available in solvent spray cleaning and trichlorethylene vapor degreasing.

3. Methods of dipping in solvent and wiping with rags saturated with solvent have not been found reliable.

4. A standard method of packaging was developed.

5. ASTM Method D 609 is still an acceptable standard method for cleaning panels until further work is completed to point the way for revision.

**Products and Bulletins**

19.2.1. AMERICAN CHEMICAL PAINT CO. Brush Alodine for protection of aluminum is described in a folder that covers comparative tests, chemicals and equipment required and advantages of brush Alodizing. A metal cleaner chart that lists various phosphoric acid metal cleaners and rust removers according to strength, temperature limits, rust and oil removal, etc. is also available.

19.2.2. KELITE PRODUCTS INC. announced Kelite Keykote for phosphatizing steel and iron. No stainless steel equipment is required in the use of this product. Keykote can be applied by spray or immersion.

19.2.3. OAKITE PRODUCTS, INC. Compound No. 33 is reported to eliminate pickling in a number of metal working operations. Removes oil and rust from metal surfaces, prepares the surface for painting, and converts a thin layer to insoluble phosphate.

19.2.4. OCTAGON PROCESS, INC. Anchorite 100 is described in an 8-page booklet. It is a phosphatizing compound that changes the surface of steel, iron, zinc and cadmium parts into an inert phosphate coating which prevents corrosion.

19.2.5. PENNSYLVANIA SALT MANUFACTURING CO: Pennsalt EC-5 is a soap based emulsifying agent formulated to give compatibility with water and with petroleum solvents. Contains special rust inhibiting agent. Steel parts cleaned in emulsion are protected against in-plant rusting for 1 to 4 weeks. Pennsalt EC-51 is a solvent emulsion cleaned based on Pennsalt EC-5 extended with a special blend petroleum solvent of the kerosene range. Pennsalt EC-54 is a solvent emulsion consisting of a high flash, high boiling solvent blend plus a rust inhibiting emulsifier. Pennsalt PB-1 is an alkaline product compounded with petroleum based foam depressants and special organic dispersing agents. Used at ¼ oz./gal in water-curtain type paint spray booths to float paint and keep booth parts clean.

## Paints—General

**General Information**

20.1.1. Payne (149a) reviews the fundamental of vehicle chemistry. The three fundamental factors which determine the type of film which is formed as well as the performance characteristics are:

1. Chemical composition.
2. Functionality of the film former.
3. Type and degree of polymerization.

The chemical composition, although influencing the second two factors, also exerts an independent influence. Many of the chemical characteristics are determined by the chemical composition of the film:

1. Hydrocarbons are acid and alkali resistant.
2. Esters are readily saponified or hydrolyzed.
3. Ether and methylene linkages are alkali resistant.

Functionality determines whether or not a chemical compound will form a resinous material. The functionality is related to the number of active groups which may be used in physical or chemical reactions. If a material with a functionality of one is reacted with itself, a dimer is formed that is not capable of further polymerization. Two materials, each with a functionality of one, likewise may be reacted together. However, no further polymerization beyond a dimer stage could take place. If each of the materials had a functionality of two, then a long chain polymer is capable of being formed. With sufficient molecular size, solids would be obtained but would be thermoplastic because of no cross linking between the chains. With a functionality of three for one material and two for another, cross linking can occur and a thermosetting resinous product is obtained. As the functionality of each material increases, the rate of achieving this thermosetting characteristic is increased. There are four general processes for polymerization: 1. Autoxidation, 2. Condensation, 3. Addition, and 4. Copolymerization.

Autoxidation polymerization occurs when a thin film absorbs oxygen and polymerizes. Condensation polymerization is associated with the removal of water or some other small molecule in the polymerization process. In the manufacture of a resinous material, increasing the degree of condensation increases the viscosity, the melting point and decreases solubility. Addition polymerization is usually associated with vinyl type polymers. Increasing the extent of polymerization results in the same general results as occured in condensation polymerization. When addition polymerization occurs with one monomer, simple addition polymerization results, such as polystyrene. When two or more materials are polymerized together, a copolymer is formed. The degree of polarity and molecular weight of a polymer determine the type of solvent necessary, degree of solubility and also the strength and other physical characteristics of the film as well as the compatibility with other materials.

20.1.2. McNabb (183) reviews the theory of copolymerization:

1. A copolymer may be formed from two or more different monomers by addition polymerization.
2. The characteristics of a copolymer cannot be obtained from blends of the polymers involved because the polymers are usually incompatible.
3. The mechanism of a copolymer formation is essentially the same as that for homopolymer formation and it involves: monomer activation or initiation, chain propagation, and chain termination.
4. The factors governing monomer reactivities are: steric effects, resonance stabilization, and polarity of double bonds.
5. Special copolymerization procedures are required to obtain homogeneous products using monomers with significant differences of reactivity as is the case with vinyl type monomers and oils.
6. The mechanism of the copolymerization reaction is very complex.
7. Unique characteristics not necessarily associated with the characteristics of the individual monomers may be obtained in a copolymer.

20.1.3. Asbeck et al (154) discuss oil adsorption and critical pigment volume concentration. In CPVC determinations, the pigment vehicle combinations employed in paints for specific applications is used for determining that point where the interstices of a dispersed pigment system is just filled by the dispersong vehicle. When a single pigment is used in a standard vehicle, a pigment packing factor (PPF) may be determined which is related to oil absorption by the following formula:

$$\text{Oil Absorption equals } \frac{(100 - \text{PPF}) \text{ sp. gr. of oil}}{(\text{PPFP sp. gr. of pigment}} \times 100$$

A rapid paint grinding technique was developed using a Red Devil type paint shaker. Both PPF and oil absorption methods are vehicle sensitive. Different results are obtained for the same pigment when vehicles of different dispersive capacities are used

The determination of PPF consists of:

1. Dispersing the pigment within the vehicle
2. Packing of pigment particles in filtration step.

Both factors are obtained mechanically with a high degree of reproducibility. With the fluidity of the dispersed paste, an electro-kinetic equilibrium is quickly established. This results in the PPF giving a value for oil absorption much closer to that which occurs in the normal film than does other methods of determining oil absorption.

20.1.4. Gusman (161) in a study on cratering obtained evidence that leads him to propose that:

1. Cratering proceeds by: a. Spreading, from isolated points on the enamel surface, of an incompatible or poorly dispersed surface active agent; b. Formation of depressions in the surface as a consequence of the spreading process; and c. Freezing in of these depressions, or craters, as the enamel hardens during baking.
2. If the surface active agents reach the enamel surface from within the bulk of the enamel, it must either be truly incompatible or poorly dispersed; otherwise it could not reach the enamel surface at discrete points but would, instead, homogenously cover the entire surface. If the surface active agent reaches the enamel surface from the air, it may be compatible but present only at discrete points.
3. According to this mechanism, cratering may be controlled by: a. Reduction of the enamel surface tension; b. Reduction of the time during which the enamel is fluid during baking, or; c. Increase of the enamel viscosity during baking.

20.1.5. Dakin (148) reports on dielectric properties of organic coatings. Varnishes consisting of:

1. Heat bodied linseed with metallic driers.
2. Tung oil with substituted phenol resin.
3. Linseed oil with substituted phenol resin.
4. Linseed oil, glyceryl phthalate resin.
5. Linseed and tung oil plus treated rosin.
6. Linseed glyceryl phthalate with 50% $TiO_2$ and 1% carbon black were examined for d-c resistance in both baked and underbaked films.

It was found that:

1. The linseed oil varnish possessed a wide range of dipolar groups which were capable of further polymerization with heat aging.
2. The drying oil phenolic varnishes showed a low order of polarity.
3. The dielectric constant of all the varnishes showed gradual decrease with increasing frequency that is characteristic of polymers having a broad dissipation factor maximum and a very wide distribution of molecular relaxation times.
4. Except with large concentrations (more than 50%) of high dielectric constant fillers, it is not possible to increase very much the dielectric constant of a low dielectric constant resin.
5. Dielectric measurement are useful in indicating the degree of internal molecular cohesion and the internal viscosity of varnish films.

20.1.6. Bobalek (268) summarizes the problems confronting the writer of specifications for coatings and suggests methods for answering the problems.

20.1.7. Scheller (259) reviews the fundamentals of aluminum paints — nature of aluminum pigments and how graded, leafing and how measured; stability, brightness, gasing and performance characteristics.

20.1.8. The Steel Structures Painting Council (386) are releasing the first set of tentative specifications covering the various methods of surface preparation for steel.

20.1.9. Pierce (281) reports on the economics of industrial maintenance painting. Studies on 429 individual cases of the protective value of 62 maintenance painting compositions of 10 different basic types conducted within the operating process areas of three major chemical manufacturing plants, widely divergent geographically, in fourteen different environments showed:

1. Over 60% of the industrial maintenance paint compositions which by long experience have proved their adequacy in straight industrial use will fail rapidly when used for maintenance painting in a chem-industrial exposure.
2. Surface preparation by blasting will increase by 2 to 4 times the protective life of the maintenance paint system over wire brushed, corroded surfaces.
3. Maintenance paint system

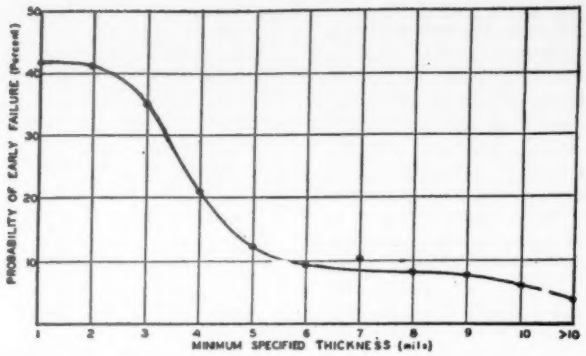
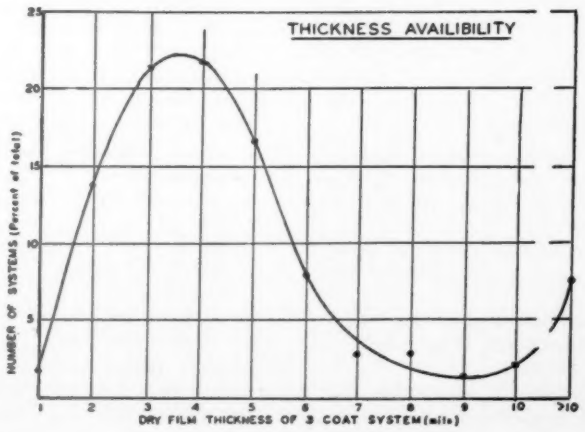



Figure I. Relationship between paint film thickness and probability of early failure.

Figure II. Thickness characteristics of paint systems currently available.



thicknesses below 5 mils are not dependable in an aggressive chem-industrial environment. Figure I.

4. Regular schedules of paint inspection and repair can reduce cost of plant protection to the magnitude of 5c per square foot per year even in aggressive chem-industrial exposure.

5. The probability of procuring useful protection of 5 mils or more in three coats from recognized systems is only 42% based on 337 studies of 62 different paint formulations. Figure II.

6. "Build per coat" is an important consideration in the purchasing and application of maintenance paint, both from a service standpoint as well as a cost standpoint.

20.1.10. Grinsfelder (341) studied the effect of nitrogen resins, alkyd resins, curing conditions and pigment on the water resistance of baked finishes. He found that the baked finishes are much weaker when wet than when dry. The films lose adhesion and tear strength but gain in flexibility. Upon re-drying most strength properties return approximately to their initial value. Adhesion, however, does not return, and, when once lost, is not regained. The alkyd resin is generally superior to the nitrogen resin, non-oxidizing alkyds are better than oxidizing, the longer curing schedules are detrimental, and zinc oxide as a small portion of the pigment is beneficial.

20.1.11. Savage and Schroeder (144) found light-scattering measurements to be valuable for indicating the average molecular size of two types of alkyd resins. The rate of consistency increase of the enamels prepared from these resins depended primarily on the acid number and the average molecular size of the resins and the reactivity of the pigments. Qualitative observations concerning the grindability and storage behavior of the grinding pastes and the skinning tendency of the enamels supplemented the correlation between the light scattering measurements on the resins and the storage stability tests on the enamels.

**House Paints**

20.2.1. Werthan (158), in a detailed coverage of the technology of formulating exterior house paints, points out that:

1. Application difficulties limit amount of bodied oil that can be used.

2. Bodied oils resist oxidative breakdown better than unbodied oils.

3. Bodied oils may be linseed, refined soybean, modified soybean, dehydrated castor, or tung oils.

6. Bodied oil containing paints — although of thinner film thickness than unbodied oil paints — furnish films of more uniform thickness.

5. The ability of a pigment to absorb ultraviolet light will influence the durability of the vehicle.

6. Pigments with fungicidal properties will improve the durability of the vehicle.

7. Studies on single pigment paints showed: a. Anatase $TiO_2$ chalks very rapidly to complete film removal; b. Non-chalking rutile $TiO_2$ retains considerable dirt, yellows, shows fine checking and cracking, appreciable mildew; c. Chalking type rutile $TiO_2$ chalks less than anatase, film tends to slough and erode to the wood, less yellowing and mildew than with non-chalking $TiO_2$; d. Zinc oxide retains gloss, dirt collects, eventually cracks and flakes, no mildew; e. Basic carbonate of white lead accumulates dirt, crow-foot checking, flaking; f. Basic sulfate of white lead cleanses by cycles of sloughing and erosion, slightly susceptible to mildew; g. Leaded zinc oxide shows good gloss retention, eventual cracking and flaking; h. Extenders give poor appearance and durability except for water-ground mica which aids durability by releaving film strains; i. Zinc sulfide eventually fails by disintegration and erosion; j. Basic silicate of white lead grays from a photochemical reaction, otherwise is similar in performance to the white lead sulfate.

8. A definite correlation exists between application consistency and film properties for exterior house paints.

9. The pigment vehicle ratio should be such that optimum consistency is obtained.

10. Vehicle balance of one part low acid Z5 oil, three parts regular linseed, two parts thinner and drier gave good paints during the war.

11. A suggested formulation consists of:

| | |
|---|---|
| Anatase $TiO_2$ | 1.75 lbs. |
| Zinc Oxide | 4.00 |
| Mica | 0.75 |
| Magnesium Silicate | 2.04 |
| Z-2 Oil | 1.07 |
| Raw Linseed oil | 3.21 |
| Thinner and drier | 1.35 |

20.2.2. Browne and Laughnan (237) studied twelve house paint formulations under controlled methods of recoating every 2, 3, 4, 5, or 6 years for a period of 15 years. They report that:

1. Too frequent or generous repainting of exterior wood surfaces leads to profound alteration in performance characteristics of house paints. Characteristic of this altered behavior is the appearance of cross-grain cracking which results in scaling.

2. Only four of the twelve paints remained free from cross-grain cracking for 15 years when repainted every six years. As the frequency of repainting increased, the resistance to cross-grain cracking decreased.

3. The marked difference in durability of paint on lightweight and heavy softwoods observed for initial paint jobs gradually diminished with successive repaintings.

20.2.3. Vannoy (263) reports data to show that:

1. Paint compositions vary widely in blister resistance with special lead-zinc pigment free alkyd stain resistant type paints showing exceptionally good performance as tested on new wood.

2. Zinc oxide is detrimental to the adhesion characteristics of certain films as tested under adverse moisture conditions.

3. Alkyd stain resistant type house paints can be made which will show more permeability than regular house paint when used on self-primed or new wood.

4. Zinc oxide in a primer serves to decrease the permeability of certain alkyd-type top coats.

5. High permeability gives superior blister resistance.

20.2.4. Wray (260) reviews the adverse effects of moisture on paint durability. Blistering of paint indicates that the wood is or has been wet and if the source of the moisture is not found and eliminated, the wood itself may develop dry rot. Presence of rusty nail heads on the surface may indicate that the wood is too wet. The source of paint failure from moisture may be classified under for general headings:

1. Faulty handling of lumber or building defects.

2. Effect of moisture from within the house.

3. Poor painting practices.

4. Poor maintenance.

20.2.5. Adams (169) describes the exposure and evaluation program being undertaken to study the performance characteristics of various paint systems on southern yellow pine.

20.2.6. The Painter Maintenance Sales Div., The Sherwin-Williams Co. issued a technical bulletin containing 12 paint formulations produced to speci-

fications by the nations painting contractors, painters and maintenance men.

20.2.7. Dunn (167) reviews with bibliography the prior art and present status of the effects of water on paint films as applied to the problem of condensation within the walls of building structures. See Tables XX and XXI. Recommendations are as follows:

1. Formulate primer sealers and flat wall paints for greater reduction in the transfer of moisture through the inside wall painting system. The primer sealer should also have high alkali resistance and low water hydrolysis effect.
2. Use of glue size should be discouraged. More paint should be applied to inside walls to reduce water transmission.
3. A film binder of lower cohesive and/or higher adhesive forces would reduce or eliminate blistering.
4. Determine whether outside paints of greater permeability would reduce failures caused from moisture within walls.

**Fire Retardant Paints**

20.3.1. Aldrich (272) examines the effects of atomic warfare on the safety of cities. Atomic explosions generate great heat which causes combustion. This combustion can be reduced by use of heat reflecting paints. Secondary fires, caused by electrical short circuits, ignited gas, etc., is the major source of fire damage, however. Reinforced steel buildings commonly called "fire proof" are subject to great fire damage because of the large contents of combustible material. Automatic sprinkler systems are unreliable in atomic warfare because of the probable damage to water lines and pumping stations. Difficulty is experienced in combatting fire because:

1. Of the sheer magnitude of the conflagration.
2. Of destruction of fire fighting equipment and personnel.
3. Of blockage of streets by rubble.

Fire preventive steps should be undertaken to:

1. Use fire retardant paints in fire-resistive structures to reduce fire spread and consumption of oxygen.
2. Combustible decorative interiors should be entirely eliminated through the use of painting techniques such as graining.
3. The custom of brick facing on concrete buildings should be changed to one of painting. Plastering of ceilings should be replaced by texture painting.

20.3.2. Sternberg (266) reviews the patent literature and general approaches available for the development of fire retarding paints.

20.3.3 Nielsen et al (96) developed a fire-retarding coating consisting of a water soluble melamine or urea resin, the reaction product of phosphoryl chloride and anhydrous ammonia, and a water-soluble alkyd resin from hydroxy polycarbonxylic acid and a polyhydric aliphatic compound, all dispersed in water. Nielsen and Marling (97) developed a fire-retarding coating composition consisting of the reaction product of phosphoryl chloride and ammonia, an amine-aldehyde resin, and a plasticizer, all dispersed in water.

20.3.4. Scholz (15) obtains a water-soluble fire retardant coating composition comprising a potentially hardenable water-soluble aminoplast resin, acid reacting ammonium phosphates, plus hiding and extender pigments.

20.3.5. Rakos (87) obtains a fireproofing coating composition useful in protection against persistent types of flame by mixing 48% sodium silicate, 20% trisodium phosphate, 20% lithopone, 10% finely divided quartz, 1% formaldehyde and 1% sodium hydroxide.

20.3.6. Chemit Co. issued a reprint that gives a summary of fire retarding paints which are available together with formulations. Integral components of such paints and what constitutes a good fire retarding paint are also presented.

20.3.7. Westgate (463) describes a vertical-panel type of fire test for a paint or similar coating. It provides a rapid, inexpensive method for determining a fire retardent index based on averaged data covering flame spread, char height and weight loss. This index number shows the precentage

| Material | Specific Permeability | Thickness Mils | Grains/ sq. ft. per hr. | Grams/10 s. cm. per 24 hours |
|---|---|---|---|---|
| Clear linseed oil | 3.0 | 1.9 | 36.9 | .619 |
| Pigmented linseed oil WRP | 1.0 | 3.3 | 9.7 | .162 |
| Pigmented linseed oil WAP | 3.0 | 1.9 | 36.9 | .619 |
| Clear varnish vehicles | 1.0 | 2.1 | 8.7 | .145 |
| Pigmented resinous vehicles | .6 | 1.5 | 9.3 | .156 |
| Primer sealers | .4 | 1.3 | 7.1 | .119 |
| Flat paint | .8 | 2.5 | 20.1 | .336 |
| Emulsion wall paint | 4.4 | 3.2 | 33 | .55 |
| Porous wall paint | 12.1 | 2.7 | 104.4 | 1.749 |
| Outside House paints | 1.0 | 3.0 | 8.4 | .141 |

WRP — Water resistant pigments
WAP — Water absorbing pigments

Table XX. Permeability of paint materials.

Table XXI. Permeability of various materials to water vapor.

| Material | Thickness inches | Grains/ sq. ft. per hr. | Grams/10 sq. cm. per 24 hrs. |
|---|---|---|---|
| Fiberboard | .492 | 60.9 | 1.02 |
| Asphalt Coated fibreboard | .492 | 8.0 | .133 |
| Wood — spruce | .480 | 4.0 | .067 |
| Wood — pine | .508 | 6.6 | .11 |
| Kraft Paper | .00394 | 167 | 2.8 |
| Masonite presdwood | .13 | 22.1 | .37 |
| Plaster | .75 | 29.8 | .50 |
| Textile Fabrics | | 1500 | 25.0 |
| Fir sheathing | .75 | 6.0 | .10 |
| Mineral wood unprotected | 4.0 | 58.1 | .99 |
| Brick masonry | 4.0 | 2.2 | .035 |
| Cement block | — | 2.0 | .034 |
| Paint film-primer | 0.0015 | 9.3 | .156 |

reduction in combustibility of wood due to its protective coating.

**Other Paints**

20.4.1. Close to 2½ million gallons of paints —$8 million's worth — are put down on the nation's highways per year (488). Nearly 85% of the states will be buying glass-beaded "reflectorized" paints. The paints must dry in half an hour yet have high durability and good night visibility.

20.4.2. A new, economical coating, compounded of starch, clay, pigments and resins will soon enable drab shipping cartons and other cardboard items to blossom forth in all the hues of the rainbow (478). This method cuts coloring costs from a previous $.50-5.00 per 1000 sq. ft. of cardboard to 51c per 1000 sq. ft.

20.4.3. Aniline inks are gaining acceptance in the packaging field (476). These inks are used on a variety of materials — from kraft paper and cotton cloth to cellophane, polyethylene and Pliofilm. On some of these, the "aniline ink method" is the only kind of printing possible.

20.4.4. Reese and Moore (461) review the history of the aerosol "bomb" as used in the paint industry. Methods of filling the "bombs" are described, and advantages of each method are cited. The operation and theory of the "bomb" are described. Simple laboratory tests are given which determine the percentage of paint solids. The coverage provided by the paint in each "bomb", and the properties of spray valves used with the "bombs" are disclosed.

20.4.5. Avery (61) produces a cementitious coating material by hydrating a mixture of Portland cement and stannous chloride which, when exposed to the atmosphere, converts to water insoluble stannous oxychloride and fills the pores and voids of the cement.

20.4.6. Waide (74) makes a high silica content paint comprising 60% white Portland cement containing 25% silica, 22% fibrous talc containing 60% silica, 10% calcium carbonate, 7% sodium chloride and 1% calcium stearate.

20.4.7. Nelson and Madison (107) obtain a cement base paint by adding a small amount of methyl cellulose in powder form to the dry Portland cement.

20.4.8. Greiner (77) obtains a tough durable and weather resistant heat curable coating composition from a suspension of finely divided mineral fillers and emulsified organosiloxane polymer in an aqueous solution of alkali silicate.

20.4.9. Kaufman and Williams (90) manufacture a heat-resistant paint or varnish by copolymerizing one part acenaphthylene, ten parts of styrene, and two parts of drying oil in the presence of a terpene.

20.4.10. Lewis et al (5) patented a coating of normal soybean oil, calcium oxide, basic carbonate of white lead, and a drier.

20.4.11. Hochberg (56) disperses a pigment in a film forming vehicle by agitating the pigment and vehicle with a coarse sand and then removing the sand when desired fineness of grind is obtained.

20.4.12. Eramus (26) obtains a paint by dispersing finely divided silicon nitride in a paint vehicle.

20.4.13. Weber (108) makes a pigmented coating composition by incorporating coloring matter in a vehicle consisting of a resin having a lower affinity for the pigment than a urea formaldehyde type resin which is subsequently dispersed in the form of fine insoluble particles.

20.4.14. Van Wirt and Jones (64) produce a colored surface on an article by applying a thickened aqueous pigment paste which is negatively charged and subsequently applying an aqueous dispersion of a cationic water-dispersible melamine or urea resin to the pigment paste after which the resin is cured by heating.

20.4.15. May and Shreve (121) obtain a water-repellent film from nitrocellulose, glyceryl ester of hydrogenated rosin and a hydrophobic material such as polyisobutylene, paraffin or ceresin in butyl acetate.

20.4.16. Nielsen and Nason (95) obtain a glowproofing composition from the combination of a phenol-aldehyde resin and the water-insoluble reaction product of phosphoryl chloride and anhydrous ammonia.

20.4.17. Timber Engineering Co. issued new specifications covering finishes for floors of northern hard maple. The specifications establish standards for finishes for both heavy duty and gymnasium floors and are designed to give users of these products the benefit of new improvements.

## Paints For Metal

**General Information**

21.1.1. Mayne (151) shows that thin varnish films allow sufficient water and oxygen to diffuse to the base metal to permit the base metal to corrode as fast as would be the case without such film protection. Since the varnish films do reduce corrosion, however, it is believed to be due to the high electrolytic resistance between the anodic and cathodic areas of the corroding base metal which, therefore, reduces the rate of corrosion. In addition to their electrolytic resistance, films also assume a positive or negative charge, depending upon their nature, which, in turn, inhibits the passage of similarly charged ions through the film. Pigments may be divided into three major classes: Inert, Basic, and Soluble. The inert pigments are those that are insoluble and do not react with the vehicle. These pigments inhibit corrosion by adding to the electrolytic resistance of the film and there probably is an optimum pigment/vehicle ratio for each pigment in each vehicle. Basic pigments form soaps by reaction with the oils present, and the inhibitive properties are associated with water soluble materials derived from the metallic soaps. Excessive soap formation, however, may result in rapid breakdown in the film. Soluble pigments function as a reservoir of inhibitive ions — usually a chromate ion. Vehicles used with these pigments should not be too impermeable to ions.

21.1.2. Dembski (143) reports on 500 exposure tests which classify 56 primers for ability to function as shop coats. Six primers have, to date, been found to be best. Three of these six are pigmented with a combination of red lead and iron oxide in phenolic, alkyd, and linseed oil vehicles. The remaining three are 52 MC 29 replacing 37% of zinc chromate with graphitic mica, red lead-iron oxide- zinc chromate-leaded zinc in a phenolic vehicle, and red lead in linseed oil. It may be of some significance that five of these primers contain mica as part of the extender.

21.1.3. Kittelberger and Elm (336) developed a method of determining the instantaneous rate of diffusion of electrolytes through organic membranes and then studied the relationship between the permeability of a paint film to sodium chloride and its general quality as a metal-protective coating.

Most of the paint systems offered considerable resistance to the diffusion of sodium chloride under a concentration gradient. Those known to possess good metal-protective properties maintained this high impermeability for some time, while other coatings lost it rapidly. The rate of loss of sodium chloride impedance was more closely related to the rate of decrease in the electrolytic resistance of the system than to the changes in the membrane potential of the films.

21.1.4. Alexander et al (363 and 444) reports on studies on anticorrosive primers for magnesium. Calcium chromate as a partial substitute for zinc yellow was found to be desirable. The relative value of chromates of barium, strontium, and calcium compare favorably with zinc. Pigment-volume relationships are not critical in the formulation of anticorrosive primers for light metals. Matrices comprised of phenolic resins appear to enjoy some advantage

over currently specified vehicles, although their use is limited by dry requirements. The role of soluble magnesium salts, particularly the chromates, is an interesting subject for further study. The inclusion of magnesium chloride and sulfate did not result in the poor quality primers normally associated with these anions.

**Exposure Conditions**

21.2.1. Mundt and Thompson (275) studied performance of a comprehensive group of coatings on steel. Fresh water, salt water and atmospheric exposures of 159 corrosion and fouling retardant or preventive organic coating materials tested at the Panama Canal for a 1-2 year period showed:

1. In the immersion tests, the sea water mean-tide was the most severe exposure and rated the coatings: vinyl antifouling, synthetic rubber, thiokol and phenolic. After one year 75% of the 82 systems tested were found to be inferior. In the continuous sea water exposure, 16% were inferior in 1 year with the greatest number being of the cold applied bituminous type. In the fresh water exposure 6% were inferior in 1 year.

2. In the atmospheric exposure 5% showed inferiority.

21.2.2. Cranmer (282) reports on gasoline resistant tank coatings. The steel cargo tanks are subjected to corrosion attack from successive cargoes of gasoline, salt water and hot salt water jets. Unpainted tanks require replacement in 5 to 12 years depending upon the degree of use. A laboratory test consisting of alternate exposure in gasoline of high aromatic content and hot sea water plus exposure to a jet of hot sea water under pressure was devised. Coatings quickly eliminated were conventional petroleum-resistant materials such as shellac, nitrocellulose and alcohol soluble phenolic resins. Of necessity, only air drying coatings could be used. As the temperature of the hot sea water exposure increased rate of failure increased. At 185 F. all coatings showed adverse affects. The laboratory screening tests of some 500 materials showed four materials to be of promise:

1. A 20% solution of vinylidene chloride/acrylonitrile copolymer in methyl ethyl ketone.

2. A vinyl base proprietary coating.

3. A vinyl/polysulfide base proprietary coating.

4. A butadiene-acrylonitrile copolymer with a sandwich coat of a "Nylon" type polyamide resin.

Service tests were conducted on coating #1, 5-brush coats with average total film thickness of 7.1 mils; #2, 1-brush coat plus 5-spray coats with average total film thickness of 7.4 mils; #3, 1-brush plus 3-spray with average total film thickness of 13.1 mils. The #1 coating gave best performance with moderate pinpoint rusting and no evidence of pitting after 43 months of service. Touch-up was satisfactory and an additional 24 months showed excellent performance. Coating #2 showed extensive peeling and blistering in less than 34 months. Coating #3 showed blistering and peeling in 13 months.

21.2.3. Sudrabin et al (278) conducted tests to determine the effects of cathodic protection on conventional paints. It was noted that in fresh water the blistering of paint increased rapidly with increasing potential measure against the surface of the paint film with a saturated KCl calomel half cell. Although blistering occurred, the paint films materially assisted cathodic protection when the potential did not exceed -850 millivolts. In sea water, the vinyl paint films blistered increasingly with increasing potential pressure across the film. At potentials less than 1000 millivolts very little, if any, blistering was encountered after 1½ years when compared to the control. On cathodically protected panels, small pinpoint white deposits formed, indicating effective policing by cathodic protection.

21.2.4. Rice (217) reviews the causes of corrosion, effect of moisture, the electrolytic theory and gives suggestions on how to put the theory into practice in corrosion resistant finishes.

21.2.5. Cook (277) discusses the problems of painting refineries. In addition to protection and decoration, paints for refineries usually need properties of:

1. Heat reflection to prevent loss of volatile products.

2. Prevention of product contamination.

3. Facilitate cleaning of equipment.

4. Light reflection to provide good visibility.

5. Resistance to abrasion, mildew, heat or flame.

General painting practice consists of:

1. With insulating materials: Dry surface free of chemical contaminants (when surface is steel: clean thoroughly plus inhibitive primer) bituminous base insulating material, finish coat of medium oil alkyd black. For color other than black, an asphalt- or phenolic-aluminum seal coat is used before finish coat.

2. Wood — for rough services — wood preservative only. Buildings or wood trim are painted according to customary practice.

3. Transite — only painted for decorative purposes. Some asphalt-aluminum gives good one coat hiding. For alkyd base paints, a penetrating sealer is usually desirable.

4. Aluminum receives a phosphoric acid etch, medium oil alkyd with zinc chromate-iron oxide primer, followed by a durable finish coat.

5. Heavy galvanized iron is durable 6-8 years before painting is necessary. Zinc dust primers, or zinc chromate, lead chromate or red lead is used.

6. Steel equipment subject to $H_2S$ receives two coats of a medium oil alkyd pigmented with zinc chromate-iron oxide followed by a finish coat of black or gray alkyd.

Other exposure results noted are:

1. Medium oil alkyd and alkyd modified chlorinated rubber are satisfactory under mild acid atmospheric conditions. Phenolics show loss of gloss.

2. Chlorinated rubber and alkyd modified chlorinated rubber give good resistance to caustic soda spillage.

3. Since aluminum pigment disintegrates on exposure to alkaline and acid conditions, aluminum-gray appearing paints are made of titanium dioxide with lampblack.

4. For temperatures over 350 F., low solid content aluminum, special heat resistant black, or high zinc dust gray paints are used.

5. For temperatures from 200 to 350 F., one-coat applications of medium oil alkyd or oil paints containing graphite are used.

6. Economics of paint selection is determined by the cost-per unit-area of applied dry film per time-unit of durability under normal plant operating conditions.

21.2.6. Crane (280) discusses the corrosion problems on the railroads. Bridges are usually painted with red lead or zinc chromate primers with 2 coats of a graphite or carbon black paint or aluminum in a synthetic resin. About 7-8 years protection is obtained Bridge floor beams, top chords, cross stringers are subjected to accelerated corrosion from brine drippings from refrigerator cars as well as abrasion from the ties. Petroleum, asphaltic or bituminous coatings are used with a normal service life of 2-4 years. Boxcars are sandblasted, painted with iron oxide or other pigmentation in oil modified synthetic resin vehicles to give 4-5 years of service. Passenger. cars are now having their structural steel framing painted with two coats of zinc chromate primer and a top coat

of bituminous emulsion to prevent corrosion on the inside where it can't be seen.

**Corrosion Resistant Coatings**

21.3.1. Shankweiler et al (279) find that corrosion resistance of chlorinated rubber coatings may be seriously impared if modified with saponifiable resins or plasticizers. Pigmented coatings in which the film consists of 50-60% chlorinated rubber, 15-20% Arochlor 5460, Chlorowax 70 or hard coumarone resins, and 25-30% Clorafin 42-S, Arochlor 1254 or Cumar P-10 gives highly effective protection to corrosion. Chlorinated rubber, when properly formulated with corrosion-inhibiting pigments, and combined with chlorinated rubber base topcoats, afford good corrosion resistant systems.

21.3.2. Fisher (19) developed a coating composition comprising a dispersion of zinc dust in solution containing a low acid resin (melamine, phenolic, alkyd, ester gum or dammar gum), and phenol modified alkyd or maleic acid modified alkyd.

21.3.3. Nordon (35) developed a coating composition of a dispersion of zinc dust in an aqueous solution of alkali metal silicate plus an oxide, such as hydrogen peroxide, to prevent frothing and increase shelf life.

21.3.4. Watson (20) developed a protective paint for metal surfaces comprising a metal phosphate suspended in a film-forming vehicle.

21.3.5. Matuszak (47) obtains rust inhibition from pentaerythritol monooleate and propylene diamine in mineral oil.

21.3.6. Fainman (51) obtains an anticorrosive material from dialkoxy diaminosilane in a liquid oleaginous lubricating material.

21.3.7. Wachter and Stillman (94) obtain a corrosion-inhibiting coating by using an organic base nitrate.

21.3.8. Lead Industries Association published the Red Lead Technical Letter No. 7 which contains the latest paint systems for the protection of hydraulic structures. Corrosion inhibitive primers and finish paints especially formulated for exposure to moist and chemically contaminated atmospheric environments and for intermittent and continuous immersion in fresh water are included.

**Anti-Fouling Coatings**

21.4.1. Pitre (43) developed an antifouling coating by adding an antifouling toxic to a matrix consisting of a rosin modified phenolic.

21.4.2. Holmes (46) obtains an antifouling pipe line enamel from blending antimony oxide with a bituminous material.

21.4.3. Cameron (60) obtains an antifouling marine paint from metallic copper, zinc and cuprous oxide dispersed in a chlorinated coal tar pitch which, when exposed to sea water, sets up a voltaic current to repel marine animal growth.

21.4.4. Carlston and Whiting (86) developed an antifouling paint composition comprising at least 60% by weight of a solid toxic agent, 15% rosin and the balance being copolymerized vinyl chloride-vinyl acetate or polyvinyl butyral.

21.4.5. Francis (112) obtains a ship hull anti-fouling paint from rosin, paraffin wax, ceresin wax, copper linoleate, cuprous oxide, and inert pigment.

## Water Paints

**Technical Information**

22.1.1. AMERICAN RESINOUS CHEMICAL CORP. has been developing a terpolymer latex resin upon which outdoor paints may be based. The terpolymer is a combination of styrene, butadiene, and a chemical relative of vinyl chloride. (473)

22.1.2. Ryden et al (166) report that latex paints using Dow Latex 512-K as a binder and a pigment system consisting of 40-40-20 mixture of titanium dioxide, zinc oxide, and mica has been found to give good results on exterior exposure on cement type or oil primed metal surfaces. Paints with a pigment volume concentration of 40% were found to have a lower chalking rate than those containing 30%. Monoethanolamine oleate contributes to the shelf stability at a practical concentration of 2 to 6 parts amine soap per 100 parts of pigment.

22.1.3. Peterson and Henson (179) describe the ground rules for formulating latex paints as follows:

1. A protein solution is used to thicken a latex paint. The more drastically the protein is treated in order to solubilize it, the less will be its ability to thicken the paint. The protein requires alkali, preferably ammonium or potassium hydroxide, water and heat to effect its solution.

2. The means of preservation against microorganisms is specific for each paint. The pH of the finished paint should be very close to 9.0. At this pH, the addition of 0.6% of a 50/50 mixture of the potassium salts of o-phenylphenol and pentachlorophenol, on the total weight of the paint, has been found to be effective.

3. The use of a water soluble or water dispersible pigment dispersing aid is a necessity. Examples: lecithin plus ammonia, complex phosphates, gum arabic and protein solutions.

4. Defoamers are usually required and are specific to a particular paint. Examples: pine oil, tributyl phosphate, octyl alcohol, nonyl alcohol, and proprietary defoamers.

5. With additions of oil, varnish or alkyd resins, additional wetting agent is necessary. Compatibility of the film of latex and modifying resin should be closely examined.

6. Some latexes require plasticizer additions before they can be considered air-drying film formers. When these latexes are used, they should be examined for use over old paint as well as repainting with various paints and varnishes to check on plasticizer softening and migration.

7. Latex paints can be formulated at a low PVC without obtaining a high gloss. This, in turn, requires a high prime pigment content in order to obtain hiding.

8. Pigments should be selected which will not furnish polyvalent metal ions which will destabilize the latex.

9. Adhesion of latex paints can be improved by the normal methods of roughening the surface to be painted. From limited work, it appears that the metallic driers and cobalt acetate improve adhesion and scrubability.

10. Resin lined cans are desired for packaging latex paints since corrosion through the tin plate will cause coagulation of the latex.

22.1.4. Scholz (428) reviews the evolution of water-thinned paints from the mud daubings of the cave men through the distemper wall paintings of the Egyptians, the frescoes of the Romans and medieval Italians, and the milk and curd paints of the Hebrews, whitewash of colonial and early United States days, resin emulsion paints and the latest in the water-thinned paint line — the latex paint.

22.1.5. Naidus (429) discussed the fundamental principles of polymerization and the role of such emulsion polymerization variables as pH, agitation, and recipe ingredients. It was shown that the variables as the copolymer composition and the emulsifying system have a profound effect upon the properties of the ultimate paint.

22.1.6. Henson et al (430) illustrated a comparative latex paint formulation versus an oil paint formulation. A schematic illustration of a highly magnified segment of paint was shown. The mechanism of film formation was subdivided into two steps and explained.

22.1.7. Brown (431) reports that penetration of water into films deposited from emulsions leads to softening,

whitening, and loss of adhesion. The mechanism of penetration proposed was: The driving force is provided by the difference between the vapor pressure of the film and the vapor pressure to which the film is exposed. The opposing force is the resistance of the film to expansion to accommodate the water "cells," and thus is a function of the elastic modulus of the film.

22.1.8. Dillon and Bradford (432) state that a plasticizer dispersed in a synthetic latex first forms an emulsion. As the system ages, the plasticizer diffuses from the emulsion droplets through the water and is absorbed by the polymer. Electron micrographs were presented showing the effect of aging the plasticized latex on the surface of a cast film and also on the individual particles. Data obtained by centrifuging plasticized latexes showed this method also reduces the aging time, thus permitting the formation of cast films without a long aging period.

22.1.9. Green (433) defines externally plasticized latices as aqueous dispersed non-film forming resins which have been compounded with plasticizer to yield an emulsion which will form useful coherent films when dried. The procedure for externally plasticizing an aqueous dispersion resin involves the emulsification of a suitable plasticizer, followed by blending with the aqueous resin dispersion to arrive at an emulsion with plasticizer and resin united in the internal phase.

22.1.10. Melsheimer and Hoback (434) brought out the fact that pigmentation of latex paints, which are O/W emulsion systems of high complexity, requires that the pigments be selected from those that are inherently resistant to the alkalinity of the vehicle and surfaces to be painted. Special requirements of low chemical reactivity, low electrolyte content, and neutral to alkaline pH must be met. For most purposes, the more lightfast pigments are preferred.

22.1.11. Bixler (435) studied the effects of protein on viscosity stability. Stable paints can be made with up to about 2% protein which gives generally adequate thickening. A minimum amount of ammonia is a satisfactory dispersant.

22.1.12. Stilbert and Cummings (436) described an intumescent fire-retardant coating composition. Some inherent disadvantages of this type of fire-retardant coating are lack of wet scrub-resistance and excessive brittleness. The properties studied were degree of intumescence and wet scrub-resistance of the over-dried coating film. Suggested optimum coating weights as well as optimum coating compositions were proposed for mill application to low density fiber insulating board.

22.1.13. DiGioia and Nelson (437) report on a study on several polymers being used or proposed for use in latex paints as far as freeze-thaw properties are concerned. The effect of particle size, emulsifying agents used in the latex polymerization, as well as variations in monomers utilized, were reported. The effect of varying the freeze-thaw method has also been studied and observations are reported. Some suggestions regarding compounding to obtain good freeze-thaw in a latex paint are given.

22.1.14. Scholl (273) covers in detail the formulation and manufacture of latex base paints. Rinse (210) summarizes the types and methods of formulating laticies into emulsion paints. Equipment and manufacturing technique (221) to follow in order to make satisfactory latex paints are suggested. Parker (185) describes the components — what they are and what they are used for — of a polystyrene or styrene copolymer emulsion paint as well as the manufacturing steps involved to prepare satisfactory paints.

22.1.15. Hahn (170) reports on studies on post plasticized polystyrene water paints as follows:

1. Processing time may be reduced by: a. Using more readily emulsified plasticizers; b. The improved uniformity of the Lustrex *X*601 polystyrene; c. Addition of additional emulsifier d. latex at a moderate uniform rate with sufficient stirring to disperse the stream as it enters the batch.

2. Studies on plasticizers showed: a. Compatible solvent plasticizers of high gel times do not properly plasticize polystyrene emulsions; b. An incompatible plasticizer yield the most fragile films of greatest hiding since it is an extreme case of infusibility; c. Plasticizers having rapid gel times yield strong films, and are usually associated with a high degree of tack which indicates good plasticizing efficiency and a lower volume of plasticizer is required. d. Optimum performance demands that the plasticizers be present in sufficient volume to gel all the polystyrene; e. Plasticizers that provide internal phase gels of highest gel tack at temperatures near freezing provide lowest freeze-thaw stability.

22.1.16. Whetstone (236) presents a detailed summary on polyvinyl acetate water paints.

**New Coatings**

22.2.1. Waldie (3) developed a method of preparing a coating composition in the form of an emulsion by reacting glycerine with a dibasic acid, and during the polymerization add a fatty acid coated pigment. When the reaction has been completed an aqueous mixture of ethylene glycol monoethyl ether and casein is added with agitation to emulsify.

22.2.2. Damboise (11) prepares emulsion paints by grinding pigments individually in a drying oil, other pigments are ground individually in water containing a protective hydrophilic colloid. The emulsion is formed by mixing one pigment in the oil phase with one in the water phase and subsequently adding the other dispersions.

22.2.3. Heijmer (18) obtained a stable emulsion of the water-in-oil type for use as a lacquer and varnish binding agent consisting of water as the dispersed phase, a drying oil as the dispersion medium, and a water-soluble thermosetting resin (urea or melamine) as the emulsifying agent.

22.2.4. Munsell (48) obtains a viscous rubbery dispersion by dispersing natural or synthetic rubber in water containing casein and an alkaline buffer salt.

22.2.5. Zola (84) obtains a stable coating composition comprising a dispersion of discrete particles of coating materials in an aqueous dispersing medium containing a suspension stabilizer.

22.2.6. Mellwig (88) obtains a water soluble pasty paint vehicle for artist's paints by combining a soap of triethanolamine and a soap forming fatty acid, starch, carbohydrate gum, a polyhydric alcohol, formaldehyde and water.

22.2.7. Schoenholz and Terry (98) obtain a high gloss thin film from a water emulsion of a polyvinyl resin, a water insoluble solvent plasticizer to serve as a film-coalescing agent, an emulsified bright drying polishing wax, a non-cationic surface active agent and a retarder of evaporation of water.

22.2.8. Iler (100) developed a composition consisting of an aqueous dispersion of a dispersed water-insoluble organic polymer and an alkali-stabilized colloidal silica.

22.2.9. Michel and Hager (114) protect a metal surface from corrosion by applying a water emulsion containing alkyl-sulfamide-carboxylic acid or the inorganic or organic salts of the acids.

**Additives for Latex Paints**

22.3.1. AMERICAN POLYMER CORP. Polyco 296BT and Polyco 296N, high and medium viscosity grades respectively of sodium polyacrylate, are recommended as stabilizers, protective colloids, and thickeners for synthetic rubber and resin latices. Reputed to possess adhesive, sus-

pending, emulsifying, and film forming characteristics.

22.3.2. AMERICAN RESINOUS CHEMICAL CORP. Aquasperse 1440-36 is a casein vehicle designed for the manufacture of latex paints. Excellent pigment wetting and dispersing properties. Casein content 13%. Viscosity 105-110 K.U., pH 8.9.

22.3.3. CARBIDE and CARBON CHEMICALS. Hydroxyethyl Starch is a white, fine particle solid that is readily soluble in cold water. Viscosity of a 5% aqueous solution, 1500-2500 cps. at 20 C. Suggested as a protective colloid, thickening agent.

22.3.4. FOSTER PUMP WORKS, INC. Because of the low lubricating value of latex-base paints, and their corrosive nature, it was necessary to design pumps in which rubbing metal-to-metal contact was eliminated and corrosion resistant metals were necessary. Because of the "layering" characteristics of latex-base paints, care is needed in flushing out and cleaning pumps and pipe lines immediately after using. Plastic fitted rotary pumps manufactured of a non-corrosive alloy are available to correct these problems.

22.3.5. RAYBO CHEMICAL CO. In experimental work on solvent dispersions of styrene-butadiene paints, it is reported that Raybo 6 shows a great influence on retardation of settling of pigments. This is particularly true where solvent proportion is relatively high.

22.3.6. ROSS and ROWE, INC. R&R 555 Interface Modifier is a colloidal surface active agent with excellent pigment dispersion properties, stabilizer and foam reducer in latex paints. The use of 1-2% is most effective.

22.3.7. SINDAR CORP. Paint-odors are a series of deodorants aimed at solving residual odors of such latices as polystyrene, polyviny acetate, styrene-butadiene copolymers and other resin bases used in these new paints. It is reported that no additional processing is necessary for these deodorants. Concentrations range from as little as 1/40 to 1/10 of 1 percent based on the weight of the solid content of the paint.

## Paint Production

### Technical Information

23.1.1. Redd (147) reports on a physical and chemical basis for mill selection and operation. The three elements of grinding are: disintegration, dispersion, and wetting. Disintegration is the reduction of the pigment particle size to the required size. Dispersion is the breaking up of agglomerates or clusters of pigment particles and wetting may be considered as a chemical substitution process, limited to the pigment surface, whereby the absorbed layer on the pigment particles is displaced by the grinding vehicle. These elements determine the selection of grinding equipment:

1. For disintegration, the grinding practice of the mining and metallurgical engineers would be followed.
2. For dispersion, disintegration grinding, where the bond of pigment agglomerates is strong, to wetting, where the bond is weak, may be followed.
3. For wetting, the maximum shear at the pigment-vehicle interface is desired.

The characteristic grinding actions of the various dispersion equipment is as follows:

1. Dispersion kneaders. The ratio of pigment to vehicle for proper consistency in kneaders is similar to the end point of an oil absorption test. When dough is made, dispersion and wetting begin simultaneously throughout the entire batch because of the high shear in the stiff paste occurs in the pigment agglomerates and the pigment-vehicle interface. Dispersion kneaders are not disintegrators.

2. Roller, colloid and bar mills grind by liquid shear also, but differ from dispersion kneaders by developing this stress in a lower consistency paste. Higher speeds and closer gaps enable equivalent shear to be obtained. However, time for wetting is short and good premixing is necessary.

3. Ball and pebble mills grind by combination of impact and attrition. The cascading balls give impact that results in disintegration, as well as shear for wetting. The main body of balls in the center of the mill that does not cascade provides liquid shear under pressure which promotes wetting and some dispersion. Best operating practice of ball and pebble mills include: a. Critical rpm speed of a mill is numerically equal to 76.6 divided by the square root of the diameter of the mill in feet. For disintegration, fastest grind is at 65% of critical speed but efficiency (new surface per horsepower hour) is increased as speed is decreased. Usually paint mills are operated at slightly slower speeds because the rate of wetting is not increased by higher speed. b. The maximum practical ball charge of grinding media is 50 % of total capacity —— a greater charge shows no improvement in grinding rate or efficiency, but a decline in both because of crowding; in addition more paint is retained on the surface of the greater number of balls. With decreasing ball charges below 45%, power is decreased and grinding time is increased. The minimum ball charge is 30%. Below this volume, cascading action is lost as well as a greater wear on the grinding media results. c. The maximum charge 45-50% in pebble and porcelain mills produces a better balance between disintegration and wetting. Steel balls, however, usually use the minimum charge of 30% with a decrease in ball size. A balance between disintegration, dispersion and wetting is obtained and grinding time is ½ of that of porcelain mills. d. The size of balls and pebbles is a compromise between proper size for grinding versus good drainage and ease of cleaning. The very small pebbles of 1/16 to 1/8-inch steel balls give very fast grind but retains paint up to the ball level. The largest size ball that will not chip the lining is a #2 or 2½ inch ball. General practice calls for a mixture of 1½ and 2 inch balls for a new mill and compensate for wear by adding 2 inch. Usual practice with steel balls is equal mixtures by weight of ½ and 5/8 inch balls. With larger balls, consistency of paste should be increased. e. Maximum paste charge is 70% with 65% customarily used. Decreasing charge decreases milling time but pounds of pigment per hour of grind remains constant. The paste charge should always cover the balls or pebbles. Lesser charges cause excessive abrasion of grinding media. f. High consistency enables greater yield, reduced abrasion on grinding media, greater shear with faster wetting, and larger balls can be used. g. A recommended loading sequence is to: Load and mill all bulky pigments of low oil absorption until partly dispersed in vehicle; load balance of pigment which requires size reduction; Load chemical pigments that are difficult to wet; load easily wet chemical pigments and pre-ground paste colors. h. Regular periods of inspection of mills should be established. Monthly inspection of grinding media for volume and density is desirable. Vent mills frequently during early part of grind. List the paste charge in order of loading. Don't run mills for long periods when washing.

23.1.2. Fox (135) studied the ability of the Morehouse Mill to disperse pigments and came to the following conclusions:

1. Pigment dispersion of seven or better are possible.
2. Formulation must be varied depending upon the type of pigment being ground.
3. Use of wetting agents always improves grind by one or two points.
4. Approximately three passes on a lab mill is equal to one pass on a production mill.
5. Proper marking and setting-in of the stones is of utmost importance.
6. With proper mill setting anything but the very heaviest of pastes can be ground to any desired degree of fineness.
7. As the mill heats up, the stones must be backed off to allow for expansion.

23.1.3. Kleinfeldt (269) reviews the engineering principles and equipment for efficient grinding and mixing operations in paint manufacture.

23.1.4. McIntyre (116) developed a grinding machine of the type having a rotor provided with open end radial slots, grinding bars fitted in said slots so as to be capable of an outward radial movement and at least one resilient flexible band bearing on said bars and urging them outwardly in and with respect to their slots.

23.1.5. Shurts (456) analyzes the industries production problems to find ways by which greater performance efficiency may be obtained with present equipment.

23.1.6. Shurts and Rosa (462) describe a new principle one-point-adjustment three-roll-mill. The mill is adapted from a conventional 3-roll mill, by lifting the center roll, moving the outer rolls closer together and securing them permanently in that position, and then lowering the center roll until it makes two line-contacts with the two fixed rolls. A downward force is applied to the center of the middle roll and this force plus those forces derived from the friction and shear due to the tack of the paste on the moving rolls acting through the roll gears as braking lever arms are the only forces used to give the adequate and proper pressures between the rolls and to secure the proper mill-roll adjustment. This one-point-adjustment is easily and quickly made, is sensitive, dependable, correct and reproducible. The rolls automatically adjust themselves at even the highest practical pressures so that there is no paste lost from the ends of the moving rolls. The paste always extends from end to end of the three rolls.

23.1.7. Barkman (137) finds that all types of straining media currently used do some good in removing large skins and reduce the total amount of contaminant present. The cartridge type strainers do the clean-up job but are expensive to use and yield very low flow rates. The centrifuge also offers a means of obtaining quality straining.

23.1.8. Ellsworth (138) made a survey of the methods of straining employed by the industry. It was apparent that the paint industry had placed too little emphasis or study on the necessity for efficient straining equipment or methods.

23.1.9. Marienthal (115) patented a multiple-adjustable mixing machine. Shaw (44) developed a paint stirrer and blender with a means to support it in an operative position on a container.

23.1.10. Jones and Snyder (328) report that the Banbury mixing characteristics of propionic acid-treated zinc oxide in natural or synthetic rubber improves dispersion and processing properties with substantial power savings.

**Paint Mills**

23.2.1. ALLIS-CHALMERS MANUFACTURING CO. issued a 44-page bulletin of engineering data on rod, pebble and ball mills. Included are points to consider when choosing a grinding mill, basic design features of different types of mills, and grinding circuits.

23.2.2. THE McHANEL REFRACTORY PORCELAIN CO. lined half a mill with its regular line of porcelain brick and half with their new "Super Porcelain Brick." Using their Super Porcelain Balls they report a substantial improvement in durability for the new materials when inspected after 205 charges (involving over 2,700 hours of operation and almost 5 million revolutions).

23.2.3. PATTERSON FOUNDRY and MACHINE CO. published "Continuous Grinding", a 28-page catalog describing their ball, tube and rod mills. Charts showing size, weight, linings, ball charge, speed, power requirements and motor sizes for the various mills are included. Accessory equipment such as feeders and mill drives is also covered. A heavy duty continuous ball or tube mill, adaptable to fine or coarse grinding, wet or dry grinding, open or closed circuit grinding, may be used to deliver a finished product, or may be operated in conjunction with Patterson classifying equipment of various types.

23.2.4. CHARLES ROSS & SON CO. Model #52T Three Roll Mill enables dispersion along the full production face of the rolls as new types of easily removed hoppers ride on the outside taper of the rolls. Latest type of thin wall roll construction and full length water-cooling assures uniform grinding and temperature control. The three rolls revolve at specifically determined differential speeds and front roll speeds of 350 rpm are used without excessive heating due to specially bored cooling chambers. A specially designed balanced apron assures uniform pressure of the thin take-off knife along the full face of the roll and eliminates scoring of the roll ends. Apron is quickly detachable. "Downtime" in cleaning is minimized by utilizing special bearings in the ajusting handwheels through which the rolls can be quickly disengaged. Catalog No. 118a is a complete, fully illustrated listing of their three roller mills, double arm kneading machines and mixers of all types with details and specifications.

23.2.5. U. S. STONEWARE CO. issued a bulletin on Burundum, "The Tubular Ginding Medium," giving physical properties as well as comparison data with other grinding material.

**Paint Mixers**

23.3.1. PAUL O. ABBE, INC. Mass and paste mixer is specially designed for large batches of caulking compounds with a capacity of 360 gallons. It stands 90 inches high and is driven by a 40 HP motor. By contrast, the small mixer of the same type has a capacity of 4 gallons, stands 17 inches high and is driven by a 1/3 or 1/2 hp motor.

23.3.2. BOWSER, INC. A 12-page folder describes construction, operation, flexibility and wide application of system for accurately blending two or more liquids in increments as low as 1/20%. Sketches show simplicity and compactness as well as various types of installations.

23.3.3. BRIGHTON COPPER WORKS, INC. A battery of 500-gallon, steam-jacketed kettles have been used is solving a stubborn rubber paint mixing problem by virtue of the double motion agitators.

23.3.4. EASTERN INDUSTRIES, INC. presents a series of portable mixers in Bulletin 510. A discussion of important factors which determine the choice of mixing equipment for a specific problem is offered as a guide to the plant engineers for preliminary planning.

23.3.5. GRENIER and CO., INC. Issued a 6-page folder describing industrial mixers designed to be clamped to open head drums, barrels, or tanks while mixing fluids.

23.3.6. INTERNATIONAL ENGINEERING, INC. in a 16 page bulletin gives curves and engineering data needed to specify mixing requirments. Various types and models are shown with specifications.

23.3.7. MIXING EQUIPMENT CO., INC. Issued Catalog B-102 des-

cribing turbine-type Lightning Mixers for open and closed tanks along with a factual discussion of fluid agitation. In 32 illustrated pages, the new Lightning Mixer catalog explains how guaranteed fluid agitation results may be obtained for any process. Also described is how mixing impellers are scientifically selected and sized for specific jobs; and how research is used to develop accurate prediction of fluid agitation results.

23.3.8. PATTERSON-KELLEY CO. Twin-Shell blender is equipped with a rotating "Intensifier Bar." The lug-studded intensifier bar improves mixing action by effectively breaking up lumps, dispersing materials which tend to agglomerate, and homogenizing liquids into solid mixes. Blenders are useful for mixing paint pigments, insecticides, metal powders, plastic powders, ceramic glazes, resins, and other compounds.

23.3.9. PROCESS INDUSTRIES ENGINEERS, INC. Mixer with separate motor coupled to propeller shaft by flexible drive shaft is especially designed for agitator service. No special motor is required, any standard horizontal motor can be used.

23.3.10. SAFETY CAR HEATING and LIGHTING CO., INC. Four-page folder describes high speed mixing by centrifuge method. Advantages of high speed mixer are listed together with various industrial applications; among them discussed are dispersion and mixing of ingredients employed in water base paints.

23.3.11. STANDARD ELECTRIC MFG. CO. Whirpool Mixer equipped with a shaft 36 inches in length has two balanced 4-inch propellers which are adjustable to any position on the shaft.

23.3.12. STRUTHERS WELLS CORP. issued Bulletin T-452 on intensive mixers, dispersion machines, mixing machines and kneaders.

23.3.13. TROY ENGINE and MACHINE CO. issued a general catalog describing the Troy line of 1-point control and 4-point control roller mills, 3-zone action colloid mills and angular mixers.

## Materials Handling

### General

24.1.1. AUTOMATIC TRANSPORTATION CO. prepared a 16-page booklet, "Materials Handling Analysis Guide," for use where no full-time materials handling engineer is on the staff. The guide affords a method of determining rapidly basic materials handling requirements. Subjects covered are: The relationship of materials handling to production, costs, shipping and packing. Included is a simple scorekeeping system that determines if a firm needs further help in investigating ways to eliminate its problems.

24.1.2. BAKER-RAULING CO. in Report 3061 presents detailed handling information on the West Penn warehouse operation with action photos to make operating details easy to understand.

24.1.3. CLARK EQUIPMENT CO. published "Basic Facts about Materials Handling" and shows how to combine small units into big ones, how to route materials, how to utilize over-head space for storage, how to use trailer trains, and utilize manpower.

24.1.4. RAPID-STANDARD CO., INC. presents 28-page catalog to help select right type of conveyors, trucks, and industrial castors.

### Drum Handling

24.2.1. BAKER-RAULANG CO. Drum clamp for fork trucks features retaining springs on the clamp's rubber-faced grab plates. These springs keep leading edges of the plates out of the way while the drums are positioned in the clamp. As the drum moves into position, grab plates close around it to provide safe handling. An economical hydraulic drum-up-ender attachment which permits fork truck operators to pick up, transport, stack and empty heavy drums without leaving their seat is available. Drums can be rotated 90 degrees for vertical or horizontal stacking, or tilted 45 degrees below horizontal for emptying at any height within the lift range of the truck.

24.2.2. DISPERSION SPECIALTIES SUPPLY has a unit that will lift and move full open drums or containers of various sizes with their covers removed.

24.2.3. ENGINEERING PRODUCTS CO., INC. Catalog illustrates various traction systems designed for plant superintendents who want to speed up the handling of heavy finished goods or raw materials to and from loading platforms, store rooms and production.

24.2.4. GIFFORD-WOOD CO. has a fully automatic conveyor system that empties up to 40 drums per hour. The totally-enclosed drum-emptying system eliminates manual lifting, cuts work hours, provides dust-free emptying and washes emptied drums.

24.2.5. MORSE MANUFACTURING CO., INC. Drum rotator is used for mixing and blending materials in 16 to 24" diameter fiber drums. One man can move this device to the spot where it is needed, load it, and handle mixing operation. When mixing is completed, drum is returned to the floor in the same way it was picked up. Rotator can be easily rolled to a new location on its castors.

24.2.6. PALMER-SHILE CO. Barrel cradle is recommended for picking up any shape barrel, plywood or fiber drums, straight or biled sides, flat or chimed ends.

24.2.7. YALE & TOWNE MANUFACTURING CO. Horizontal drum handling device can be attached to any industrial fork truck without removing the forks or making any hydraulic or mechanical connections. Completely automatic, the device is a self-contained unit.

### Trucks

24.3.1. BAKER-RAULING CO. Photos and drawings show how two simple adjustments change the carriage from a fork-space and clamp to a side-shifter to give four-way carriage.

24.3.2. CLARK EQUIPMENT CO. Diesal power for the Yardlift-40 fork lift to reduce fuel costs. Elimination of ignition system reduces sparking dangers.

24.3.3. HOWE SCALE CO. issued a 12-page catalog of their latest two and four-wheel hand trucks, trailer trucks, baggage wagons, platform skids, dollies, lift jack systems, wheels, casters, and molded-on rubber tired wheels.

24.3.4. MARKET FORGE CO. Load-Mobile, an electric lift truck, is equipped with a narrow lifting platform to suit special applications. The width of the platform is only 18" and can be furnished in 6, 7, 9 and 11" lowered heights to engage conventional platforms.

24.3.5. RAPIDS-STANDARD CO., INC. A 2-color bulletin with complete description specifications and prices of Wheel-Ezy hand trucks was issued. Also issued a revised 36-page Rapistan Caster and Truck Catalog, fully-indexed with photos and specifications on casters and wheels designed to handle light, medium, or heavy loads on all types of floor surfaces.

### Storage and Pallets

24.4.1. BARRETT-CRAVENS CO. Bulletin 5221 presents Barrett steel storage racks for drums, barrels, crates, bins, skids and pallets. All these applications are illustrated with installation views. This bulletin demonstrates how storage rack systems solve lack of floor space problems.

24.4.2. BAKER-RAULING CO. Special pallet increased storage capacity of an outside drum storage area 100% by making it possible to fork truck the drums and stack them 4-high in the yard.

24.4.3. EQUIPMENT MANUFACTURING, INC. Construction of drum racks is of welded square tubular steel, making it strong and capable of safely handling heavy loads. Principal advantages are that the racks permit stacking drums to ceiling heights while at the same time selection of any drum can be made without shifting or disturbing others. Design permits removal by fork truck and horizontal position makes possible the use of faucets for drawing off small quantities.

24.4.4. LAMSON CORP. Automatic pallet loader arrangement for intermediate storage of pallets awaiting removal after being loaded makes it possible to accumulate up to six loaded pallets while waiting for a fork truck. Loaded pallets are pushed off the Pallet Loader's discharge conveyor onto a second conveyor at right angles to the discharge.

**Weight Feeders**

24.5.1. BIRD-ARCHER CO. Chemical feed packaged unit which delivers liquids in desired amounts under pressure is ideally suited for feeding boiler water treatment as well as delivering chemicals and other fluids for processing. This self-contained, extra heavy unit offers high pressure controlled feed at low cost. The chemical reservoir tank is of sturdy welded steel construction, available in 50 or 100 gal. capacity. The chemical proportioning pump can be designed for various rates of feed at different pressures.

24.5.2. JEFFREY MANUFACTURING CO. Waytrol constant weight feeders are based on the balance principle. Material is delivered from a hopper by a vibrating electric feeder. It falls on a "weight belt" which corresponds to one arm of the balance. Other arm is standard weighing beam with sliding weights. Position of beam controls the vibrator feed rate through an on-off control. Photoelectric control is the chief innovation in this small feeder.

24.5.3. LINK-BELT CO. issued a 28-page book No. 2475 containing photographs of the Bulk-Flo in a wide variety of applications, together with typical layout drawings, engineering data, calculation tables, charts and formulas. Over 150 materials are analysed for average weight and such characteristics as size, flowability and abrasiveness.

**Pumps**

24.6.1. Thompson (203) outlines the factors to be considered for effective pumping operations in the paint industry:

1. Pipes should be 2″ or better in diameter. Pipes should be cleaned by circulating thinners to prevent buildup of corrosion products.
2. Pumps should not move materials faster than a 50% increase over natural flow under gravity for that diameter pipe.
3. The proper pump to operate at an efficient speed commensurate with the viscosity characteristics of the liquid handled should be used.
4. Location of pump is frequently of importance. Use of suction-positive feed pumps may fractionally distill solvents if the volatility of the solvents is such that the suction lift causes the solvent to volatilize.

24.6.2. DE LAVAL STEAM TURBINE CO. Their rotary positive displacement pump offers all the advantages of the IMO design; has only three moving parts; is reliable, quiet, pulsation free, compact, excellent for high-speed operation; suitable for capacities to 80 gpm, pressures to 275 psi and intermittent pressures up to 325 psi.

24.6.3. HILLS-McCANNA CO. issued a catalog that gives full information on line of mechanical drive "U" type metering and proportioning pumps.

24.6.4. KENCO, INC. issued a specification folder with complete description of pump capacity, design features, specifications and dimensions of Model P-104 pump.

24.6.5. MILWAUKEE HYDROPOWER, INC. Pump with capacity of 1½ gpm down to ¼ gpm is suitable for handling light viscosity fluids. Known as Magna-Mite pump, this unit is similar to vane type pumps.

24.6.6. PEERLESS PUMP DIV. developed a magnetic pump. Leakproof, has no rotating member between driven and liquid ends, no rotating seals and no packing. Power is transmitted from motor to impeller by a magnetic drive. Geometric and magnetic considerations limit the size of the pump to 2 hp or less.

24.6.7. WORTHINGTON PUMP and MACHINERY CORP. All models are positive-displacement, sliding-vane type in which pressure of the liquid being pumped maintains contact of vanes against liner. Pumps have built-in relief valves and can be made of all bronze or bronze fitted.

24.6.8. FOSTER PUMP WORKS has a slide rule that computes the friction of varying capacities in different sizes of pipes with viscosity of the liquid being known. With this slide rule, accurate pipe friction losses can be determined for all liquids. It is specially useful in determining the size of pumps and the hp required to drive the pumps.

**Flow and Metering Devices**

24.7.1. BRISTOL CO. issued a 40-page bulletin describing the company's Series 500 line of flow meters with descriptions of instruments for recording, integrating, indicating, automatic controlling, and telemetering the flow of steam, water, air, gas, oil, solutions and other fluids. Both mechanical and electric type flow meters are described in a full range of models suitable for a wide variety of uses in industrial plants.

24.7.2. TRINITY EQUIPMENT CORP. issued a bulletin on Thermowells, Sight Flow Indicators, that describes their positive seal, light weight and tamperproof construction. Also included is an overall dimensions chart and schedule of pressure ratings.

24.7.3. FISCHER and PORTER CO. Metering device, V/A Cell, meters a continuous by-pass stream around an orifice and thereby the metering is kinetic. A linear relationship exists between the metered by-pass flow and the main flow. A simple adjustment of the by-pass rate gives the unit enormous flexibility. The V/A Cell is adaptable to pneumatic connections at points remote from the orifice.

**Valves**

24.8.1. Kentler (225) describes the Nordstrom lubricated plug valve and explains how it can serve as an all-purpose valve for the paint, varnish and lacquer industry.

24.8.2. M. B. Benson, Conoflow Corp., issued a 16-page bulletin covering the developments of our present day control valves.

24.8.3. ROCKWELL MANUFACTURING CO. issued Bulletin V-217 describing types, sizes, operations and features of Rockwell-Built Nordstrom Corrosion Resistant Valves. Tables are included listing approximately 175 different chemicals with their recommended alloy valves and lubricants.

**Filtration**

24.9.1. Deschere (261) discussed varnish filtration:

1. Wash the filter cake to recover as much of the desired material as possible.
2. The size of the filter depends on the size of the varnish batch and the speed desired for filtering.
3. Precoating of metal screens is standard practice. A cloth screen should also be precoated.
4. In a horizontal filter the flow will be faster.

24.9.2. MARVEL ENGINEERING CO. Hydraulic and low pressure liquid recirculating machinery which formerly required multiple installation of filters to gain adequate filter capacity may now get this capacity in a single unite. Simple maintenance features with no moving parts, great capacity in small space, plus room for foreign matter accumulation results in less down time.

24.9.3. NIAGARA FILTER CORP. Style H Filter gives 2 to 3 times the flow rates of conventional filter presses, per sq. ft. of filter area. Flow rates up to 1000 gal. per min.; solids capacity up to 150 cu. ft. This filter is recommended for all standard liquid clarification where low headroom or other special reasons make its horizontal construction preferable to vertical tank pressure leaf filters.

24.9.4. T. SHRIVER & CO. INC. in a 32-page booklet gives complete information on filter presses for separating solid particles from a mixture of liquids and solids. Description includes types offered, specifications, capacities, construction material, requirements and costs.

24.9.5. J. A. ZURN MFG. CO. Several types of pipe line strainers for all purposes ranging in size from ½" to 36", some of which embody new concepts of design and function for making continuous production processes possible are described and illustrated in Pipe Line Strainer Data Manual. Summarizing important developments resulting from continuous engineering research in fluid handling equipment, this illustrated manual carries information on the factors to consider in selecting type and size of strainer for specific applications and the effect of flow rate, screen loading and the viscosity of fluid on pressure drop.

**Labeling and Shipping**

24.10.1. F. L. BURT CO. is marketing a filler that is convertible for filling quart to gallon containers without any change of parts. A single shot piston discharges 15 or more fills per minute of desired quantity with complete accuracy.

24.10.2. PACKER MACHINERY CORP. issued a 12-page catalog describing straight line, semi-automatic liquid filling equipment. Four basic types, operating on either vacuum or gravity principles are discussed.

24.10.3. ABBE ENGINEERING, INC. Labeler for various types of containers. Uses ungummed or pregummed labels; with simple changeover, will also handle heat activated labels. Adjusting mechanisms used in adapting machine to different size labels and containers.

24.10.4. PAISLEY PRODUCTS INC. published a revised 8-page illustrated service bulletin, "Round Container Labeling." Sections deal with food container, chemical product container, government specification container labeling and a description of labeling methods.

24.10.5. ACME STEEL CO. Strapping Machine designed to speed high-volume flat steel strapping operations, and reduce operator fatigue, this machine produces strap joints by spot welding. Machine can accommodate many different package sizes and there is no limit to the amount of strap that can be fed or the amount of slack that can be taken up.

24.10.6. Superintendent of Documents, Government Printing Office published a Manual on Preservation, Packaging and Packing Military Supplies for the Department of Defense Agencies. Based largely on former Navy publications covers three service branches.

24.10.7. BAKER-RAULING CO. in a 8-page booklet shows how manufacturers can use the unit load shipping technique to make the most of recent Interstate Commerce Commission decisions which lowered pallet-return rates in the Central States region. The booklet brings shippers up to date on unit load shipping, tells how unitized loads save money on the shipping dock by cutting manpower requirements and reducing pilferage and damage losses. Action photos illustrate the unit load system at work.

**Plant Maintenance**

25.1.1. French (241) examines the factors involved in formulating a maintenance policy that includes:

1. The proper time of maintenance considering down time, wear, profit condition.
2. Means of auditing service time by ratio to sales dollars, direct labor, or direct costs.
3. Centralization or decentralization of the maintenance department.
4. Who is to have authority (production, maintenance or management) as to when repairs take place.

25.1.2. Suchy (247) presents a systematic maintenance program covering plant inspections, duties of the plant engineer, method of accounting and other factors. Leonard (382) lists the five basic factors to good maintenance as: Attitude of management; Adequate work order system; Adequate organization; Planned maintenance; Budgetary control and reporting system.

25.1.3. Buschmann (245) explains that the scientific use of color can increase production, reduce absenteeism, improve safety records, housekeeping and morale. Brightness ratio (relative amount of light reflected from two surfaces) should not exceed 1 to 10 throughout the plant for best results. Judicious use of color on machines will focus attention on the work, intensify the awareness of the worker to potential hazards from the machine. Gaugler (252) reviews the factors that govern the selection of desired color, such as: Lighting, tradition, age, season, etc.

25.1.4. Hollingsworth (244) covers the three essentials for lubricating machines as follows:

1. Machines must be designed for adequate lubrication and for the proper application of lubricants.
2. The proper lubricant must be purchased and suitable inventories maintained where needed.
3. The correct lubricant must be delivered at the proper time and quantity to the particular spot at each machine throughout the manufacturing areas.

25.1.5. Woolfenden (255) supplies a check list to cover inspection and maintenance of plant and equipment from the corrosive attack of chemicals.

25.1.6. Ross (249) illustrates the economies obtained from efficient plant operational layout and gives a practical approach to the layout of each department and how they should be related to each other.

25.1.7. Keene (246) outlines the factors involved in planning a lighting system for a plant including the degree of illumination, construction features, cost of power, voltage, temperature of the area, fluorescent lighting, use of reflectors, mechanical arrangement and cost factors.

25.1.8. Beitman (248) suggests a program for training people for maintenance work, covering selection of personnel, training programs, and results obtained.

25.1.9. Campbell (253) discusses the problems, and procedures for a planned maintenance program for power plant and heating equipment.

25.1.10. Hanson (251) reviews the various power plant design factors that affect maintenance operations.

25.1.11. Ross (200) claims that reduction in vibration of paint machinery will:

1. Save on the structure's maineanance cost.
2. Bring greater operating efficiency.
3. Add to the employee safety margin.
4. Increase power output per unit.
5. Reduce equipment maintenance cost.

This can be achieved by properly engineering the shock absorber devices and periodically examining such devices to determine whether they are still working effectively.

25.1.12. Acheson (209) explains the cause of pulsation with centrifugal blowers and its elimination by:

1. Selection of proper blower.
2. Replacing with smaller capacity unit or using a small capacity unit for turn-down periods.
3. Use of bleeds or recirculation.

25.1.13. Borger (262) described a catalytic method for fume disposal in a varnish plant. Problems and methods of solution of fume control in the varnish industry is reviewed (202). Kropp and Simonsen (235) describe a scrubbing device for air pollution control and cite performance results under various operating conditions.

25.1.14. SELAS CORP. of AMERICA issued two bulletins pertaining to equipment for the removal of water, water-oil emulsions and dirt from com-

pressed air and gas lines. Another bulletin describes two protective devices used in the piping systems of gas-and-air combustion systems. The automatic fire check is used to detect, localize and extinguish a flashback in the gas-air mixture lines.

25.1.15. PANGBORN CORP. Cloth-bag collects dusts such as carbon black, cork, graphite, pigments, etc. Simplified design of filter bags and mechanism for reclaiming dust from bags, provides dust control at low equipment and installation cost. Obtainable in 5 to 40 foot lengths with one to six hoppers with various types of disposals. "The Control of Industrial Dust" is a 28-page bulletin covering applications of dust control with case histories.

## Production—Miscellaneous

### Heating

26.1.1. DEMING CO. Known as Motor-Mount, these units effect savings in fuel by returning the condensate from steam coils, radiators, or steam operated equipment back to the boiler. Motor-Mount centrifugal pumps are used on these units. They have enclosed type bronze impeller and stainless steel shaft. The deep stuffing box has conventional packing rings for grease lubrication. Pump is mounted on the legs of the tank so no base is required.

26.1.2. SELAS CORP. of AMERICA. Multiport flame type gas burners can be used with any commercial fuel gas and in any air-gas mixing system that develops the required mixing pressure. Capacities and specifications are given with appropriate dimensional drawings.

26.1.3. EDWIN L. WEIGAND CO. Portable and built-in electric air heaters used in every industry land business are described in folder. Convection, blower, duct and radiant types available for immediate shipment are shown along with suitable automatic controls.

### Fire Extinguishers

26.2.1. AMERICAN-LA FRANCE-FOAMITE CORP. "Correct Fire Protection" is a guide for operators of fire extinguishing equipment in selection of proper extinguisher for use on various types of fires. Various sizes and types of units are described with different kinds of fire extinguishing agents.

26.2.2. STOP-FIRE, INC. One-Hand operation is one of the characteristics of the pressurized portable fire extinguisher, "Redi-Grip." The range of this equipment exceeds 30 feet and the discharge time of 1 qt. size is about 27 sec. at 70 F. Available in 1, 2½ and 4 qt. sizes.

26.2.3. RANDOLPH LABORATORIES, INC. has a poster that illustrates correct fire extinguisher for all types of fires.

### Drums

26.3.1. GENERAL TIRE'S rubber drums are increasing their use as a replacement for glass carboys (474). The rubber drums are lighter in weight, shippable under less costly classification, require less space for stacking.

26.3.2. THE PANGBORN CORP. offers a 6-page brochure on fast low-cost drum cleaning by throwing metallic abrasives against drum surfaces by centrifugal force.

26.3.3. THE MEYERCORD CO. Any metal, glass or composition returnable container can be permanently identified with decal nameplates applied to any rough, smooth or crinkled surface, flat or curved. Types C and G mar-proof decals are designed for high resistance to abrasion, moisture and temperature extremes.

### Cans

26.4.1. CONTINENTAL CAN CO. developed "Overseal" in response to a need created by the U. S. Post Office when it ruled it mandatory for shippers to solder covers of paint cans in several places before mailing. "Overseal" eliminates the need for soldering, is attractive in appearance and performs efficiently by exerting an even pressure on all points of the can cover. A breakaway tearstrip for easy removal is a feature. The seal may be applied to the can with a simple closing machine. "Tripletite" paint cans are now constructed with the special seam needed to anchor and hold these seals.

26.4.2. McCauley (62) patented a closure for paint cans.

26.4.3. REYNOLDS METALS CO. presents improved packaging methods that replace the ordinary "tin" can. These new packages can be made on standard automatic high-speed packaging equipment readily available.

### Other

26.5.1. ALLIS-CHALMERS MFG. CO. Construction details of explosion proof, fan-cooled, and non-ventilated motors are described in bulletin 51 B 7286 A.

26.5.2. BRIGHTON COPPER WORKS, INC. A new feature of the water-cooled synthetic resin kettle provides for cooling the contents from a point immediately below the flange of the top head to within 18″ of the bottom. Water is evenly distributed between the jacket, and the jacket is provided with an expansion joint.

Cooling medium used is city water. Kettle has 1000 gal. capacity and is built entirely of solid stainless steel for operation under vacuum or pressures up to 40 psi. Gas-fired but has every safety feature and advantage of Dowtherm. Push-button automatic pilot flame ignition; push-button control that admits cooling air to temperature control when burners are shut off; signal lights that indicate every stage of burner operation; high sensitivity electronic controller that indicates as well as records; choice of two speed or variable speed agitator drive.

26.5.3. BURLING INSTRUMENT CO. issued a 12-page illustrated catalog No. G-17, which describes their full line of temperature controls.

26.5.4. CENTRAL SAFETY EQUIPMENT CO. "Ventadrum" is a new safety valve designed to effectively control and eliminate dangerous explosions caused by pressure expansions in 50 gal. metal drums. Easily screwed into the bung opening of a universal type drum, this valve:

1. Permits air to enter the drum on contraction of liquid or while liquid is being extracted.
2. Permits air to escape slowly during the expansion of liquid by temperature changes.
3. Relieves excess pressure rapidly in event container becomes involved in fire or quick temperature change.
4. Automatically reseats and shuts off vapor flow when pressure has been relieved.
5. Has integral fire screens to prevent fire from traveling into drum.
6. Automatically seals itself if drum is turned over.

26.5.5. CHICAGO BLOWER CORP. Mushroom Power Exhauster is used for roof venti.ating application. Can also be used as a fresh air supply unit by reversing direction of flow. Squat mushroomtype diffuser head, reduces turbulence and discharge losses to minimum.

26.5.6. COLONIAL IRON WORKS CO. issued an 8-page illustrated bulletin to show their engineering and fabrication facilities for a wide variety of tanks, kettles, towers, reactors and similar equipment.

26.5.7. DEVILBISS CO. Compressors, mountable on trailer with standard trailer hitch for towing behind a car or truck, or skid mounted where great mobility is not required are available in three sizes to deliver 21, 35, or 50 cubic feet of air per minute.

26.5.8. J. M. LEHMANN CO. describes their methods of reconditioning machines in an 8-page booklet.

26.5.9. SELAS CORP. OF AMERICA issued a bulletin describing the application of a wide range of equipment to precision processing of fluids — liquids, air and other gases. Heating liquids, in batches and continuously; liquid phase separation; clarification, polishing and cold sterilization are described.

26.5.10. WESTINGHOUSE ELEC-

TRIC CORP. issued a brochure discussing the coordinated application of motors and controls in solving general application problems such as corrosion, hazardous locations, outdoor service, and minimum space and weight.

26.5.11. WESTON ELECTRICAL INSTURMENT CORP. issued Bulletin #1320 on Tag Self Operated temperature and pressure controllers.

## Test Methods and Devices

### General

27.1.1. Fuller (182) defines control testing as the testing of production batches to determine whether they are up to standard, and suitable for shipment. He suggests that large plants have their control lab report directly to management whereas smaller plants could have the control laboratory set up under the development laboratory. Most causes for customer complaints fall into one of the following categories:

1. Poor formula: a. Defect was apparent when the batch was tested; b. Defect developed later.
2. Poor raw material control: a. Defect was apparent when the batch was tested. b. Defect developed later.
3. Poor standard:
4. Poor method of test: a. Method was incomplete, failing to cover the property in which the batch proved defective in use; b. The method was poorly designed and, hence, failed to reveal the shortcoming.
5. Poor technique in conducting the test.
6. Laxity in interpreting or applying the test results.

A quality control plan is suggested as follows:

1. When the formula is issued, numerical values or their equivalents shall be fixed by the formulator for adequate quality control.
2. The formulator supplies the production department with a temporary standard of one pint. Permanent standards will be taken from first production batch to be replaced from subsequent batches that resemble the standard as much as possible.
3. Color standards will consist of: a. Liquid standards for pigmented sealers, primers, undercoats, shingle stains, color varnishes, penetrating oil stains, pigment stains, wood fillers, paint and enamel top coats in white and in deep colors; b. Dry panel standards for top coat paint and enamel tints and specified deep colors.
4. Methods of test should refer to the standard ASTM and Federation methods as well as Federal Specification TT-P-141b;
5. Adequate records on well planned forms should be kept.

27.1.2. Tada (152) reports a procedure whereby the larvae of barnacle, *Balanus Amphitrite*, is reared in the laboratory and made to attach directly to painted surfaces in a glass vessel. By studying the number and stages of the attached larvae, the toxicities of the paints can be determined.

27.1.3. Menard (445) discussed the types of metal used and the manufacture of collapsible tubes together with their pharmaceutical and industrial use. The method of coating tubes and the types of coatings are described. The physical and chemical tests used for elavuation of these coatings and printing inks are described. The tests include flexibility, adhesion, and resistance to the various conditions encountered in general use.

27.1.4. Tamblyn and Armstrong (446) modified the Atlas Twin-Arc Weatherometer by adding eight 20-watt fluorescent sun lamps, mounted vertically about 2 inches inside the revolving specimen rack. In this way, the short-ultraviolet content of the radiation striking the test specimens has been increased to make the total ultraviolet distribution more closely resemble that of sunlight. Qualitative and quantitative evaluations of weathering damage in plastic specimens are discussed. A method of uniformalizing the exposures received by individual test pieces is described. Correlation of accelerated weathering in this machine with natural weathering on the roof at Kingsport, Tenn. has proved to be better than that obtained with the un-modified Weatherometer.

27.1.5. Bolson (447) describes an analytical method developed to measure the ability of Freon 12 or Freon 22 to extract soluble material from varnish films.

27.1.6. Pfleiderer and Machlowitz (464) developed tests to evaluate sprayability, "delivery rate" viscosity, effect on stressed plastics, usability in normal shop operations, stacking under load, adhesion, tensile strength, ultimate elongation, strippability after weathering, protection of stressed and unstressed plastic from paint materials, and storage stability characteristics of spray-applied strippable protective coatings for formed acrylic plastic parts.

27.1.7. Ma (342) developed an apparatus to handle test specimens in a horizontal position to ensure equal duration of immersion of all parts in a corrosive medium with the continuous up and down movement of the specimen to effect even distribution of corrosion conditions of the entire sample. Glass sewing thread was found most satisfactory for supporting specimens.

27.1.8. Kronstein (383) describes a profile anlyzer for measuring the "thickness" of a grit blasted surface. To resist moisture penetration, he reports that the paint coating should be three times the profile depth or "thickness" of the surface.

27.1.9. Dunn (136) describes a method of test for the comparative dry hiding power of paint at a specified film thickness and complete hiding power at a contrast ratio of 98%.

27.1.10. Hoekstra and van Laar (238) describe an instrument which gives controlled accurate measurement of resistance of a paint film to penetration.

27.1.11. Gerald (333) describes a fluid bed flowmeter, simple in construction, that gives a continuous indication of rate, is adaptable to measuring corrosive liquids, has small holdup and no stagnat pockets, is very sensitive without large pressure drop and is suitable for laboratory and pilot plant work.

27.1.12. Tentative Methods of Testing Drying Oils (ASTM D555-51T) have been designed to meet the need of the paint and drying oil industries for a comprehensive set of methods for the purpose implied. The new Method for Measurement of Dry Film Thickness of Non-Magnetic Coatings of Paint, Varnish, Lacquer, and Related Products applied on a Magnetic Base (D 1186-51T). Tentative Specification for Asphalt Base Emulsions for Use as Protective Coatings for Metal (D 1187-51T) is largely a performance type specification.

27.1.13. Van Etten (367) describes a micro method of determining saponification equivalent that is applicable to a wide range of esters, including volatile esters and some that require drastic treatment in order to bring about complete reactions.

27.1.14. Siggia and Hanna (368) report that aniline can be applied to determining carboxylic anhydride in the presence of their acids.

27.1.15. Warfield (374) describes a convenient test for highly active methylene groups in organic compounds.

27.1.16. Brantley and Carpenter (149) present a literature review of the factors affecting adhesion and means of measurement. Malloy et al (422) describe the design and operation of a ultra-centrifugal adhesion tester.

Kronstein et al (421) studied methods for the comparative evaluation of paint bonding metal phosphate pretreatments.

27.1.17. Lawall (459) compiled information on commercial laboratory facilities throughout the country.

### Optical Techniques

27.2.1. Trautman et al (164) put the electron microscope to use in studying paint films and noticed that:

# VISCOSITY CONVERSION CHART

D - specific gravity
FACTOR - instrument factor
SEC. - reading in seconds
CPS. - centipoises

DALLAS PAINT & VARNISH PRODUCTION CLUB

Temperature 77° F.
Accuracy in most cases 10%
See accompanying article.
May 3, 1952

| POISES | | | .10 | .20 | .50 | 1 | 2 | 5 | 10 | 20 | 50 | 100 | 200 | 500 | 1000 | 2000 | 5000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AMERICAN CAN - SEC. | X D | | | | | | 57 | 143 | 286 | 572 | 1428 | 2860 | 5720 | 14,280 | | | |
| ASTM .07 - SEC. | X D | | | | | 72 | 143 | 357 | 715 | 1430 | 3570 | 7150 | 14,300 | 35,700 | | | |
| ASTM .10 - SEC. | X D | | | | | | 42 | 104 | 208 | 417 | 1041 | 2080 | 4170 | 10,410 | | | |
| ASTM .15 - SEC. | X D | | | | | | | 24 | 48 | 95 | 238 | 476 | 953 | 2380 | 4760 | 9530 | 23,800 |
| ASTM .20 - SEC. | X D | | | | | | | 8 | 16 | 33 | 82 | 164 | 328 | 820 | 1640 | 3280 | 8200 |
| ASTM .25 - SEC. | X D | | | | | | | | 7 | 14 | 36 | 72 | 143 | 357 | 715 | 1430 | 3570 |
| AULT & WIBORG B - SEC. | X D | | | | | | 11 | 27 | 54 | 108 | 270 | 540 | 1080 | 2700 | 5400 | 10,800 | 27,000 |
| AULT & WIBORG CRUCIBLE - SEC. | X D | | | | | | 17 | 43 | 86 | 171 | 427 | 855 | 1710 | 4270 | 8550 | 17,100 | 42,700 |
| BARBEY - UNITS | X D | | 740 | 320 | 130 | 65 | 32 | 13 | 6 | 3 | | | | | | | |
| BRABENDER - UNITS | | | | | | | | 120 | 260 | 480 | 1020 | | | | | | |
| BROOKFIELD - CPS | | | 10 | 20 | 50 | 100 | 200 | 500 | 1000 | 2000 | 5000 | 10,000 | 20,000 | 50,000 | 100,000 | 200,000 | 500,000 |
| CASPER'S TIN PLATE - SEC. | X D | | | | | | 55 | 139 | 278 | 555 | 1390 | 2780 | 5550 | 13,900 | 27,800 | 55,500 | |
| CONTINENTAL CAN - SEC. | X D | | | | | | 60 | 151 | 303 | 606 | 1515 | 3030 | 6060 | 15,150 | 30,300 | 60,600 | |
| CROWN CORK & SEAL - SEC. | X D | | | | | | 60 | 151 | 303 | 606 | 1515 | 3030 | 6060 | 15,150 | 30,300 | 60,600 | |
| DEMMLER #1 - SEC. | X FACTOR, D | | | | | 32 | 63 | 156 | 312 | | | | | | | | |
| DEMMLER #10 - SEC. | X FACTOR, D | | | | | 3 | 6 | 15 | 31 | | | | | | | | |
| ENGLER - DEGREES | X D | | | | | 14 | 27 | 68 | 137 | 274 | 685 | 1370 | 2740 | 6850 | 13,700 | 27,400 | |
| ENGLER - SEC. | X D | | | | | 690 | 1300 | 3460 | 7000 | 14,000 | 34,800 | 70,500 | | | | | |
| FENSKE - SEC. | X FACTOR, D | | 10 | 20 | 50 | 100 | 200 | 500 | 1000 | 2000 | 5000 | 10,000 | 20,000 | 50,000 | 100,000 | 200,000 | |
| FORD #3 - SEC. | X D | | | | | 42 | 84 | 208 | 416 | 834 | 2081 | 4160 | 8340 | 20,810 | 41,600 | 83,400 | |
| FORD #4 - SEC. | X D | | | | | 30 | 55 | 135 | 270 | 540 | 1350 | 2700 | 5400 | 13,500 | 27,000 | 54,000 | |
| FISHER ELECTRO - CPS | | | 10 | 20 | 50 | 100 | 200 | 500 | 1000 | 2000 | 5000 | 10,000 | 20,000 | 50,000 | | | |
| GARDNER HOLDT - UNITS | X D | | A-3 | A-2 | A | D | H | S | W | Y-Z | Z3 | Z5 | Z6-Z7 | Z7-Z8 | Z10 | | |
| GARDNER HOLDT - SEC. | X D | | | | | | | 5 | 10 | 20 | 50 | 100 | 200 | 500 | 1000 | | |
| GARDNER VERTICAL - SEC. | X D | | | | | | | 5 | 10 | 20 | 50 | 100 | 200 | 500 | 1000 | 2000 | 5000 |
| HERCULES - SEC. | X FACTOR, D | | | | | | | | 3 | 5 | 13 | 27 | 53 | 133 | 265 | 530 | 1330 |
| HOEPPLER - SEC. | X FACTOR, D | | 10 | 20 | 50 | 100 | 200 | 500 | 1000 | 2000 | 5000 | 10,000 | 20,000 | 50,000 | 100,000 | | |
| INTERCHEMICAL 8° - SEC. | X D | | | | | 10 | 20 | 50 | 100 | 200 | 500 | 1000 | | | | | |
| KREBS-STORMER - UNITS (KU) | | | | | | | | 67 | 35 | 105 | 140 | | | | | | |
| LITHO VAR. - UNITS | X D | | | | | | 000 | 00 | 0 | 2- | 3-4 | 5- | 6 | | 8- | | |
| MAC MICHAEL (ASTM) - DEGREES | #30 | | | | | | | | 18 | 36 | 89 | | | | | | |
| MOBILOMETER 100G,20 CM - UNITS | | | | | | 12 | 20 | 45 | 90 | 190 | 500 | | | | | | |
| MURPHY VARNISH - SEC. | X D | | | | | 33 | 65 | 162 | 323 | 645 | 1612 | 3230 | 6450 | 16,120 | 32,300 | 64,500 | |
| OKO OIL - SEC. | X D | | | | | | | | | 537 | 570 | M2½ | M7½ | M17-M25 | M37 | | |
| OSTWALD - SEC. | X FACTOR, D | | 10 | 20 | 50 | 100 | 200 | 500 | 1000 | 2000 | 5000 | 10,000 | 20,000 | 50,000 | 100,000 | 200,000 | |
| PARLIN 7 - SEC. | X D | | | | | 77 | 154 | 385 | 770 | 1540 | 3850 | 7700 | 15,400 | 38,500 | 77,000 | | |
| PARLIN 10 - SEC. | X D | | | | | 21 | 42 | 104 | 208 | 416 | 1040 | 2080 | 4150 | 10,400 | 20,800 | 41,600 | |
| PARLIN 15 - SEC. | X D | | | | | | 10 | 25 | 47 | 93 | 232 | 465 | 930 | 2320 | 4650 | 9300 | |
| PARLIN 20 - SEC. | X D | | | | | | | 8 | 17 | 33 | 83 | 167 | 333 | 833 | 1667 | 3330 | 3330 |
| PARLIN 25 - SEC. | X D | | | | | | | | | 15 | 36 | 72 | 143 | 357 | 715 | 1430 | 3570 |
| PARLIN 30 - SEC. | X D | | | | | | | | | | 19 | 38 | 77 | 192 | 384 | 770 | 1920 |
| PRATT & LAMBERT A - SEC. | X D | | | | 82 | 164 | 328 | 820 | 1640 | 3280 | 8200 | 16,400 | 32,800 | 82,000 | | | |
| PRATT & LAMBERT B - SEC. | X D | | | | | 82 | 164 | 410 | 820 | 1640 | 4100 | 8200 | 16,400 | 41,000 | | | |
| PRATT & LAMBERT C - SEC. | X D | | | | | 41 | 82 | 206 | 411 | 823 | 2060 | 4110 | 8230 | 20,600 | 41,100 | 82,300 | |
| PRATT & LAMBERT D - SEC. | X D | | | | | | 41 | 103 | 205 | 410 | 1027 | 2050 | 4100 | 10,270 | 20,500 | 41,000 | |
| PRATT & LAMBERT E - SEC. | X D | | | | | | 20 | 51 | 103 | 205 | 513 | 1027 | 2050 | 5130 | 10,270 | 20,500 | 31,300 |
| PRATT & LAMBERT F - SEC. | X D | | | | | | 10 | 26 | 51 | 102 | 256 | 513 | 1025 | 2560 | 5130 | 10,250 | 25,600 |
| PRATT & LAMBERT G - SEC. | X D | | | | | | | 13 | 26 | 52 | 131 | 263 | 526 | 1315 | 2630 | 5260 | 13,150 |
| PRATT & LAMBERT H - SEC. | X D | | | | | | | | 13 | 26 | 66 | 131 | 264 | 658 | 1315 | 2640 | 6580 |
| PRATT & LAMBERT I - SEC. | X D | | | | | | | | 7 | 13 | 33 | 66 | 131 | 329 | 660 | 1315 | 3290 |
| REDWOOD ADMIRALTY - SEC. | X D | | | | | 40 | 80 | 200 | 400 | 790 | 1930 | 4060 | 7900 | | | | |
| REDWOOD STD. - SEC. | X D | | | | | 435 | 870 | 2070 | 4350 | 8700 | 20,700 | 43,500 | 87,000 | | | | |
| SAYBOLT FUROL - SEC. | X D | | | | 24 | 48 | 96 | 238 | 476 | 954 | 2380 | 4760 | 9540 | 23,800 | 47,600 | 95,400 | |
| SAYBOLT UNIVERSAL (SUS) - SEC. | X D | | | 96 | 238 | 476 | 954 | 2380 | 4760 | 9540 | 23,800 | 47,600 | 95,400 | | | | |
| SCOTT - SEC. | X D | | | | 31 | 63 | 125 | 313 | 625 | 1250 | 3130 | 6250 | 12,500 | 31,300 | 62,500 | | |
| STORMER,CYL. (150 GR.) SEC. | | | | 10 | 16 | 27 | 49 | 114 | 223 | 440 | 1090 | 2180 | | | | | |
| UBBELOHDE - SEC. | X FACTOR, D | | 10 | 20 | 50 | 100 | 200 | 500 | 1000 | 2000 | 5000 | 10,000 | 20,000 | 50,000 | 100,000 | 200,000 | |
| WESTINGHOUSE - SEC. | X D | | | | | 30 | 59 | 147 | 294 | 588 | 1470 | 2940 | 5880 | 14,700 | 29,400 | 58,800 | |
| ZAHN G 1 - SEC. | X D | | | 38 | 60 | 100 | 267 | 667 | 1332 | 2670 | 6670 | 13,320 | 26,700 | 66,700 | | | |
| ZAHN G 2 - SEC. | X D | | | 16 | 24 | 42 | 82 | 161 | 323 | 645 | 1610 | 3230 | 6450 | 16,100 | 32,300 | 64,500 | |
| ZAHN G 3 - SEC. | X D | | | | | | 27 | 58 | 113 | 204 | 510 | 1020 | 2040 | 5100 | 10,200 | 20,400 | 51,000 |
| ZAHN G 4 - SEC. | X D | | | | | | 19 | 38 | 71 | 160 | 400 | 800 | 1600 | 4000 | 8000 | 16,000 | 40,000 |
| ZAHN G 5 - SEC. | X D | | | | | | 13 | 27 | 50 | 97 | 212 | 424 | 848 | 2120 | 4240 | 8480 | 21,200 |

Table XXII

1. Electron microscopy does not explain the function performed by centrifuging after dispersion in a Baker Perkins mill but does present evidence that the popular explanation for the need of centrifuging is incorrect.

2. As a research tool in problems of color formulation, the electron microscope may find profitable use in problems involving fine particle size pigments.

27.2.2. Smith (455) reports that surface bronze as observed in paints is due to the high index of refraction usually associated with strong absorption bands. Other "Bronzy" phenomena related to interference resulting from regular geometric surface characteristics may not be properly classified as "surface bronze". The classification of surface bronze as a special kind of gloss is a direct result of elementary considerations of geometric reflectance characteristics of surfaces as related to microscopic surface structure and refractive index. The technique of goniophotometry have been employed under special conditions to provide means for measurement and specification of surface bronze.

27.2.3. Reeves (465) found that the uncertainties involved in visual rating of floor tile resins and other binder components according to the coal-tar resin color system can be resolved by the use of a photoelectric photometer if equipped with the proper filter.

27.2.4. DE-TEC-TRONIC LABORATORIES, INC. issued a catalog illustrating and describing a complete line of amplifier-relays and light source and phototube units with design standardized to eliminate high cost of specially engineered apparatus.

27.2.5. R. Y. FERNER CO. INC. Microscopes of improved design featuring a patented strip in Bertrand lens and a revised substage construction which permits full field illumination on all powers without complicated condenser fittings.

27.2.6. FISHER SCIENTIFIC CO. Chromatography Unit. This apparatus can be put to use immediately even by a worker unaccustomed to this method of analysis. The drop of sample is applied to a strip and hangs from a support rack. When capillary action moves the solvent down the strip, components of the original drop separate vertically as individual streaks or bands. The determination depend on the relative positions of the bands. The apparatus is totally enclosed which makes possible the saturated atmosphere required for optimum analyses.

27.2.7. HELLIGE, INC. 1. Colorimeter and turbidmeter is designed for chemical analysis, product grading and process control in paint and varnish manufacture. Uses include detection of contamination, control of polymerization, and color grading of solvents. Selective color filters cover entire visible spectrum. Operates on all standard voltages and frequencies as well as from dry cells. 2. Daylight illuminator provides most suitable light light for colorimetric work and insures reproducible results independent of time or weather. Equipped with specially coated bulb and Corning Daylite Glass Filter.

27.2.8. MANUFACTURERS ENGINEERING & EQUIPMENT CORP. Differential Colorimeter Useful in obtaining color measurements of paints, pigments, etc. is equipped with three color filters to give approximations to the ICI, X, Y, and Z functions, and transmissions and reflections are measured directly.

27.2.9. NORTH AMERICAN PHILIPS CO. 1. "What is X-Ray Diffraction," an 8-page booklet on the uses of the equipment for paint problems. The non-destructive analysis method identifies components or raw materials to assure uniformity, in identifying unknown materials and constituents of mixtures, and in identifying impurities. Equipment also used in production for selection of raw materials, for production analysis and control, for tracing physical or chemical changes during technological processes and for checking quality of finished product. 2. Cameras for X-Ray Diffraction are available in two sizes, 114.59 mm and 57.3 mm diameters. Will record up to 17 Angstrom spacings with copper radiation with low air scatter and unusually clear patters in the forward reflection region. 3. Norelco Fluorescence Analysis Unit incorporates improvements to aid rapid qualitative and quantitative analysis of constituents in metals, alloys, minerals, ores, chemical mixtures and compounds.

27.2.10. PHOTOVOLT CORP. issued 4-page bulletin explaining oil color photometry of vegetable oils and fats by means of a photoelectric interference-filter colorimeter.

**Viscosity**

27.3.1. Ziegler (168) reports on an order of magnitude correlation between the various methods of determining viscosity. Summary is given in Table XXII.

27.3.2. Zettlemoyer and Lower (454) studied the rheology properties of calcium carbonate in polybutene oil. The particle size of the pigment was found to have a marked effect on viscosity. The smaller the particle size, the greater the viscosity at a given loading. The addition of a surface active agent, stearic acid, was found to reduce the viscosity by localizing the pigment-vehicle interaction and thus decreasing the thickness of the shell of absorbed vehicle.

27.3.3. BROOKFIELD ENGINEERING LABORATORIES, INC. 1. An eight-speed Brookfield Viscometer, Model LVT, is useful where wide ranges of viscosity may be encountered. When equipped with UL adapter, this viscometer can measure any viscosity between 0.5 cps. and 2,000,000 cps. with accuracy, according to the manufacturer. 2. Viscometer stand for use with Brookfield viscometer is fitted with a special bar-type spindle. This Brookfield Helipath stand makes it possible for the operator to secure consistency measurements in relative centipoise values of materials of widely different viscosity characteristics.

27.3.5. CASTOR LABORATORY EQUIPMENT CO. Pressurized Viscosity Cup permits greater accuracy and lattitude in viscosity studies. Measures of viscosities are in terms of pressure, quantity, time and orifice size.

27.3.6. HENRY A. GARDNER LABORATORY, INC. Zahn viscosimeter operates on the principle of allowing the liquid to be tested to flow through a calibrated orifice in bottom of metal cup.

27.3.7. GEOPHYSICAL MACHINE WORKS. Fann V-G meter measures the force needed to balance torque applied to freely rotating cylinder in the material being tested while this material is being spun. It tests viscosities from 1 to 150 cps or gel strengths up to 200 grams.

27.3.8 EMIL GREINER CO. Unitized constant temperature bath for use with capillary viscosimeters is designed with a new turbine type stirrer, provided perfect temperature control and distribution without air entrainment; new type holder permits free insertion of a tube in the chuck-like grip.

27.3.9. RICH-ROTH LABORATORIES. "Ultra-Viscoson" for continuous, automatic viscosity measurements utilizes ultrasonics, has no moving parts, operates to 650 F., 10,000 atms. pressure, may be installed permanently in pipe lines, production kettles, or used in test tubes and beakers. Indicates viscosity of Newtonian materials from 0 to 50,000 cps x. grams/cc. Connection to recorder or controller provides continuous charts or automatic control.

**Heating**

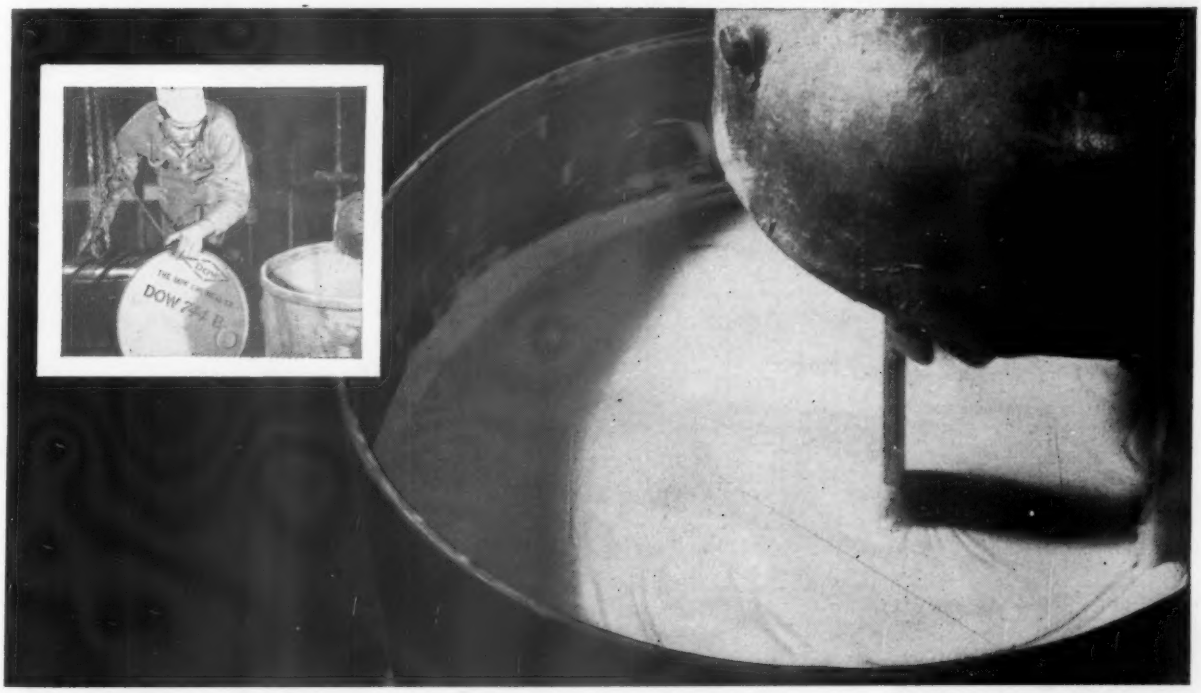
27.4.1. FISHER SCIENTIFIC CO. The constancy of bath temperatures is plus or minus 0.005 degrees C. over range of minus 5 to plus 107 C. Both employs an electronic circuit to control 400 and 800 watt heaters. Stirring is effected by a 1150 rpm motor and

(*Turn to page 73*)

DOW

# DOW LATEX 744B IMPROVES LATEX PAINT FORMULATIONS

## Offers low odor, good adhesion, formulation freedom . . . excellent compatibility with modifying materials



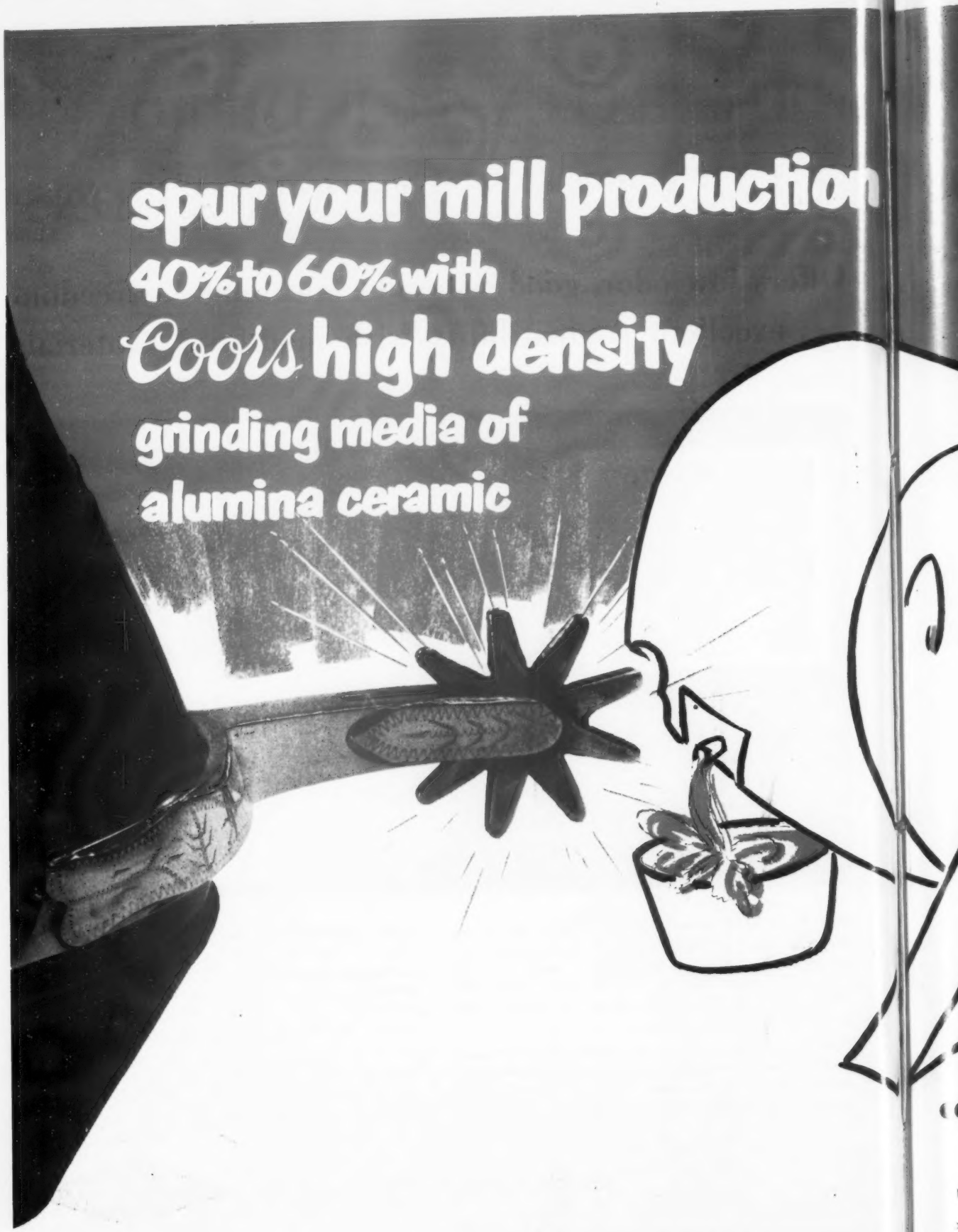

Dow Latex 744B gives paint formulations all of the properties which are familiar to users of latex paints such as fast-drying, ease of application, cleanability and absence of painty odor. In addition, Dow Latex 744B offers extra formulation possibilities for making even better and different latex paints.

Dow Latex 744B is only one of several excellent latexes made by Dow to give your latex paints the special characteristics their use demands. We'll be glad to supply technical information concerning the characteristics of other popular Dow latexes such as 512-K and 762-W. They are superior for the ease with which they can be formulated, for the excellent shelf-stability which can be obtained, and for their uniformity. For further information write THE DOW CHEMICAL COMPANY, Midland, Michigan, Plastics Department, Coatings Section, PL 1390.

*Watch for Dow's big latex paint promotion starting in April with full-page advertisements in* LIFE, THE SATURDAY EVENING POST, BETTER HOMES AND GARDENS. *See that your dealers are stocked for extra sales!*

*you can depend on* DOW PLASTICS

DOW


spur your mill production
40% to 60% with
Coors high density
grinding media of
alumina ceramic

## Spur Your Mill Production With Coors High Density Grinding Media

Get 40% to 60% more production from your *present* mills. How? By doing only two things.

1. Charge your mills with COORS High Density Media instead of conventional porcelain balls or pebbles, and

2. Increase the pigment concentration in your paste (never less than 90 to 100 KU viscosity) to give the COORS High Density Media something to work against.

By using a high viscosity batch you get the maximum work from this high density media. In fact, the proper paste consistency approaches that used in steel ball mills.

COORS High Density Media is being used in Porcelain lined, stone lined and unlined mills. In unlined mills, COORS Media is used to replace steel balls where iron contamination must be held to a minimum.

COORS High Density Media is available in the form of Balls—or in the Natural Shape, developed specifically for paint pigment dispersion. The specially curved surface areas of the Natural Shape Media give the mortar and pestle action needed to speed dispersion.

Write for the name of your nearest COORS representative today. See how you can SPUR mill production and pour 40% to 60% more paint from your present mill equipment!

COORS PORCELAIN COMPANY
c/o LZP Industrial Ceramics
2500 West 7th Ave., Denver 4, Colo.

☐ I would like information and samples of Coors Natural Shape Alumina Ceramic Grinding Media.

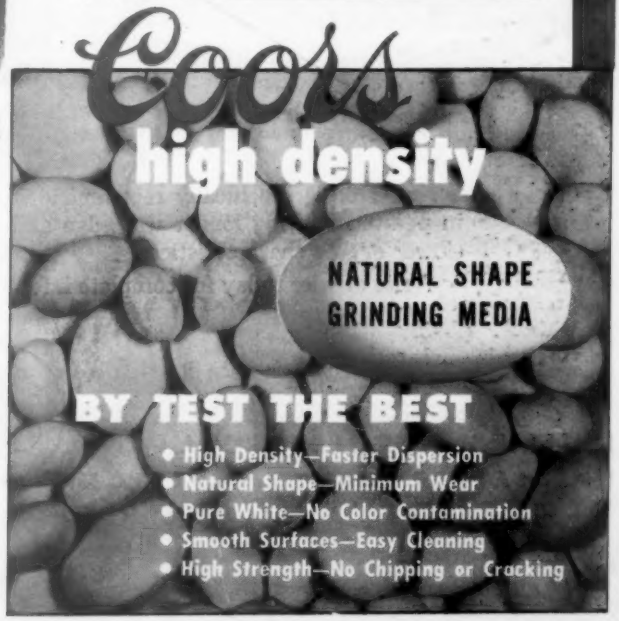
☐ Also, please send information on Coors Spherical Grinding Ball of Alumina Ceramic.

*Name*_____ *Title*_____

*Company*_____

*Address*_____

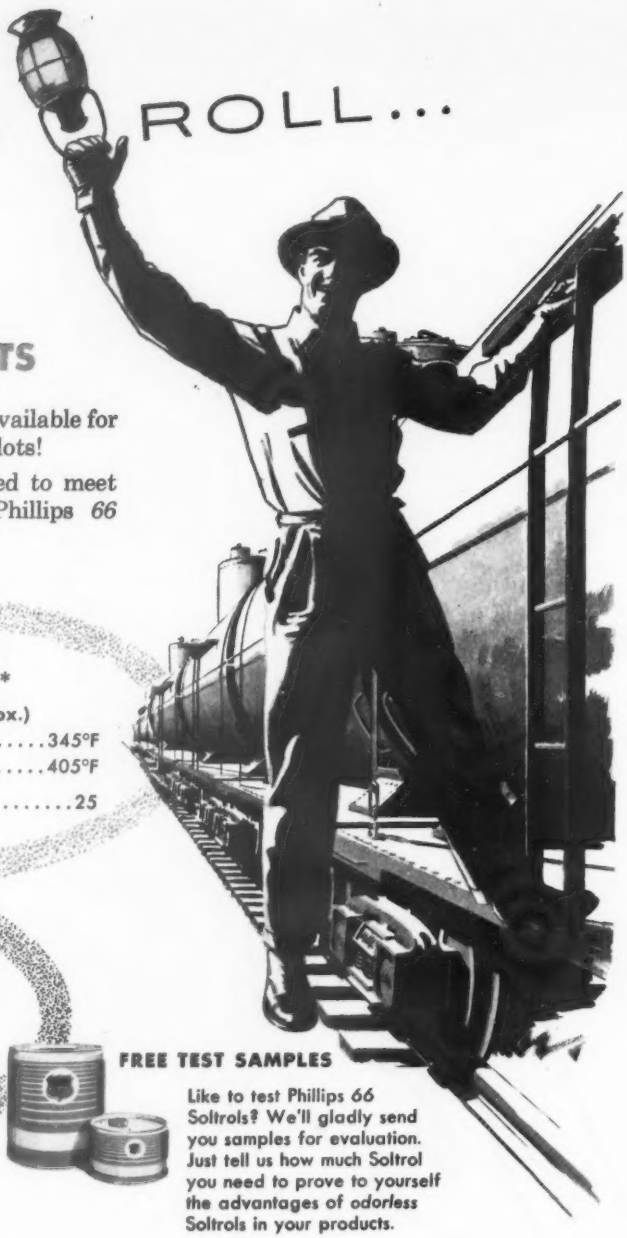
*City & State*_____




CHEMICAL AND SCIENTIFIC PORCELAIN WARE — COORS USA — Internationally Recognized for Quality

**COORS PORCELAIN COMPANY**
**GOLDEN, COLORADO**
National Sales Representatives
LZP INDUSTRIAL CERAMICS
2500 West 7th Avenue, Denver 4, Colorado
*Write or wire for the name of your local representative.*

# READY TO ROLL...



## ODORLESS MINERAL SPIRITS

High quality *odorless* mineral spirits now available for prompt shipment in tank cars or carload lots!

No waiting! No delay! We are prepared to meet your *full production requirements* for Phillips *66* Soltrol* in either of two boiling ranges:

**PHILLIPS 66 SOLTROL-130***

**Boiling Range (Approx.)**

| | |
|---|---|
| IBP | 345°F |
| EP | 405°F |
| Kauri Butanol Number | 25 |

**PHILLIPS 66 SOLTROL-170***

**Boiling Range (Approx.)**

| | |
|---|---|
| IBP | 410°F |
| EP | 450°F |
| Kauri Butanol Number | 23 |



**FREE TEST SAMPLES**

Like to test Phillips *66* Soltrols? We'll gladly send you samples for evaluation. Just tell us how much Soltrol you need to prove to yourself the advantages of *odorless* Soltrols in your products.

Soltrol-170* is specifically recommended in paints requiring longer wet edge and slower drying characteristics.

Write or wire today for complete information on these pace-setting odorless mineral spirits: Phillips *66* Soltrol-130* and Phillips *66* Soltrol-170*.

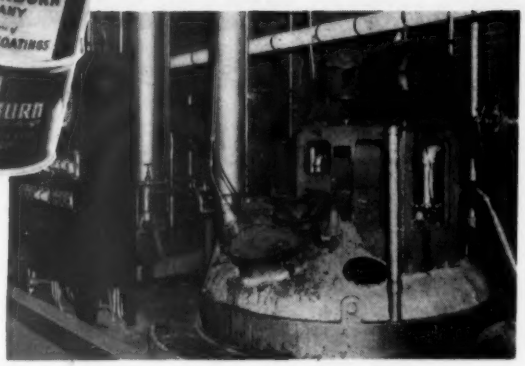
**PHILLIPS PETROLEUM COMPANY**
**SPECIAL PRODUCTS DIVISION**
**BARTLESVILLE, OKLAHOMA**

ODORLESS MINERAL SPIRITS
SOLTROL*

*A Trademark

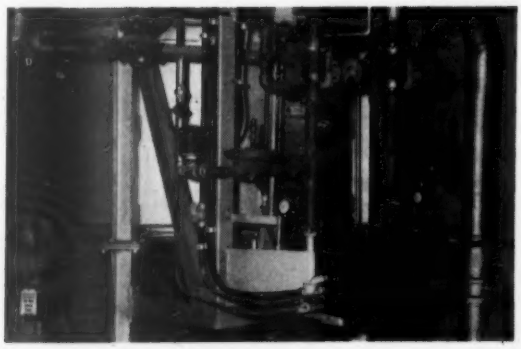
# Number 3540 ALKYD

**The Nation's number 1 Alkyd**



**WASHBURN'S Number 3540 Alkyd has a natural thixotropic body scientifically obtained through chemical reaction in our most modern kettles.**

**Number 3539, Number 3697 Alkyds and Number 3423 oleo resinous varnish, also available to complete an entire decorative program with paints made with odorless solvent.**



**Use Number 3540 Alkyd in all paints where ease of brushing, hold out, no sagging, color retention and non settling in containers is desired.**

**For full and complete information on the Nation's Number One versatile alkyd Number 3540 manufactured with either regular or odorless solvent write today to**

**REGIONAL WAREHOUSES IN:**
**Los Angeles • San Francisco • Denver • Seattle • Atlanta • Dallas**

## T.F. WASHBURN COMPANY

**2244 Elston Avenue, Chicago 14, Illinois**

C. K. WILLIAMS & CO.
offers you
an entirely new
iron oxide pigment!

KROMA RED

more brilliant—softer grinding

With the development of these new Kroma Reds you can now enjoy the economy of low cost iron oxide pigments on work never before considered practical for the iron oxide group. For three good reasons:

1. Brighter mass color
2. Cleaner tints
3. More uniform particle size

**KROMA REDS** are now available to you in a full range of shades from light red to deep maroon. We know you'll want the outstanding facts about these new Kroma Reds as soon as possible. Ask your Williams representative . . . or send today for free Kroma Red Tech Report which gives you a full description of their distinctive physical and chemical characteristics. Address Department 23.

WILLIAMS
COLORS & PIGMENTS

C. K. WILLIAMS & CO. • E. St. Louis, Ill. • Easton, Pa. • Emeryville, Cal.

108 Shades and Types of Iron Oxide Pigments

## CALENDAR OF EVENTS

**Mar. 15-19.** Spring Meeting of ACS in Los Angeles, Calif.; Div. of Paint, Plastics and Printing Ink, Mar. 16-18, Hotel Statler, Pacific Room.

**Mar. 16-20.** National Ass'n. of Corrosion Engineers, Sherman Hotel, Chicago, Ill.

**Mar. 18-21.** 17th Annual Convention of the Southern Paint and Varnish Production Club, Buena Vista Hotel, Biloxi, Miss.

**Production Club Meetings**

**Baltimore,** 2nd Friday, Park Plaza Hotel.

**Chicago,** 1st Monday, Furniture Mart.

**C.D.I.C.,** 2nd Monday.

Cincinnati — Oct., Dec., Mar., May, Hotel Alms.

Dayton — Nov., Feb., April, Suttmillers.

Indianapolis — Sept., Claypoll Hotel.

Columbus — Jan., June, Fort Hayes Hotel.

**Cleveland,** 3rd Friday, Harvey Restaurant.

**Dallas,** 2nd Thursday, No Fixed Place.

**Detroit,** 4th Tuesday, Rackham Building.

**Golden Gate,** Last Monday, El Jardin Restaurant, San Francisco.

**Houston,** 2nd Tuesday, Seven Seas Restaurant.

**Kansas City,** 2nd Wednesday, Pickwick Hotel.

**Los Angeles,** 2nd Wednesday, Scully's Cafe.

**Louisville,** 3rd Wednesday, Seelbach Hotel.

**Montreal,** 1st Wednesday, Queen's Hotel.

**New England,** 3rd Thursday, Puritan Hotel, Boston.

**New York,** 1st Thursday, Building Trades Employers Assn.

**Northwestern,** 1st Friday, St. Paul Town and Country Club.

**Pacific Northwest,** Annual Meetings only.

**Philadelphia,** 3rd Wednesday, Engineer's Club.

**Pittsburgh,** 1st Monday, Fort Pitt Hotel.

**St. Louis,** 3rd Tuesday, Forest Park Hotel.

**Southern,** Annual Meetings Only.

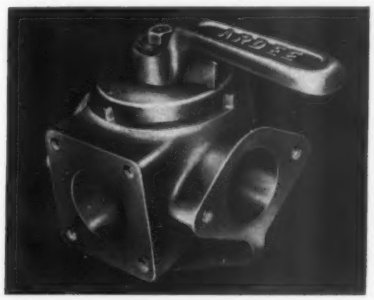
**Tofonto,** 3rd Monday, Diana Sweets, Ltd.

**Western New York,** 1st Monday, 40-8 Club, Buffaol.

# NEW PRODUCTS & IMPROVEMENTS

A MONTHLY MARKET SURVEY

**This section is intended to keep our readers informed of new and improved products. While every effort is made to include only reputable products, their presence here does not constitute an official endorsement.**



ARDEE

**RECIRCULATING VALVE**

**Leakproof**

Recirculating valve is used for stream dividing applications of gases, oil and mild chemicals. It is claimed that a positive leakproof condition is obtained and that handle loads and internal wear are reduced to a minimum by the use of an externally adjustable spring seating control featuring multiple pressure contact against hardened wear ring. Manufacturer reports recent tests indicate minimum pressure drop and full pipe orifice flow characteristics in 2" size now being produced. Ardee Manufacturing Co., 840 North Seward St., Los Angeles 38, Calif.

**DIMETHYL ISOPHTHALATE**

**Various Uses**

Dimethyl isophthalate is used in the preparation of plasticizers, alkyds, and polymers. Some of the advantages indicated by this new material, according to the manufacturer, include plasticizers with improved low-temperature efficiency and lower volatility; tougher, longer-lasting protective coatings based on oil-modified alkyd resins; and improved toughness in laminating resins. Hercules Powder Co., Wilmington, Del.

**STAINLESS STEEL CLAMP**

**Ends Breakage**

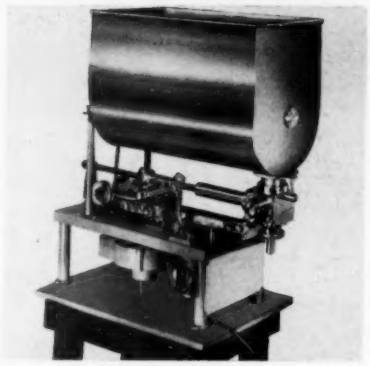
Known as Therm-clamp, this unit holds the thermometer upright against the side of the beaker even when the solution "bumps." Made of corrosion-resistant stainless steel, this clamp has just enough tension to hold thermometer firmly without damaging it. With this clamp, the thermometer is in a convenient position for reading. Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa.

FISHER

**HIGH ROSIN TALL OIL**

**Non-Crystallizing Liquid**

Non-crystallizing tall oil called "Flextal" can be made with up to 60 percent rosin acid in liquid form. According to the manufacturer, this tall oil can be used as a replacement for rosin-fatty acid mixtures used in the production of varnish. Esters made from this oil are claimed to be fast drying, fast bodying, light in color with good color retention and elasticity. It blends with all petroleum bases, makes stable emulsions and is fluid at normal temperatures. Farac Oil & Chemical Co., 145th St. and Indiana Ave., Chicago 27, Ill.



BURT

**PISTON FILLER**

**Portable Type**

Portable filler that can be moved and operated by one man is recommended for liquids and semi-solids, according to the manufacturer. Plugs into light socket and is ready for operator filling of from 15 to 30 1 oz. to 32 oz. containers per minute. Model B filler is 16" wide, 31" long, 33" high. Net weight complete with "U" shaped hopper and ¼ hp motor is only 138 lbs. May be stopped by operator in middle of discharge stroke without stopping motor. Dismantled in 3 to 5 minutes. Easily and quickly cleaned. . .sturdily constructed of acid resistant metals with stainless steel and nickel alloy contact parts. Manufactured by F. L. Burt Company, 571 7th Street, San Francisco 3, Calif.

**UREA RESIN**

**High Curing Speed**

Beetle Resin 220-8, butylated urea-formaldehyde resin solution, is claimed by the manufacturer to have the following properties: higher curing speed, greater alkali, soap, and acid resistance. This resin is recommended for use with either short oil, oxidizing or short oil, non-oxidizing resins. American Cyanamid Co., Coating Resins Dept., 30 Rockefeller Plaza, New York 20, N. Y.

## NEW PRODUCTS

### FLUSHED COLORS
**Dispersed in Alkyd Vehicle**

Line of flushed colors dispersed in an alkyd vehicle is available for formulating industrial finishes.

The vehicle employed in the colors is a medium-short, soya bean oil alkyd resin. It contains 36 per cent phthalic-anhydride, chosen because it is fast-drying, has a good initial color, and good color-retention qualities, when subjected to elevated temperatures. Another basis for its selection is the vehicle's wide range of compatibility with other resins.

A complete range of 25 organic and inorganic colors, including anatase and rutile titanium dioxide pigments, make up the new line. They are available from Hilton-Davis in 55-gallon and 35-gallon drums, and 5-gallon pails. Hilton-Davis Chemical Co., Div. of Sterling Drug, Inc., Cincinnati, Ohio.

### DIBUTYL MALEATE
**Lower Priced**

Tank car quantities of dibutyl maleate are available at a new low price. This material is used as a chemical plasticizer, for polymerization reactions in general and specifically with vinyl chloride. Specifications and price lists are now available from Dewy and Almy, Cambridge, Mass.

TENNEY

### TEST CABINETS
**For Temp.-Humidity Tests**

Standard line of enviromental test chamber permits purchaser to select chambers from existing specifications and eliminates the extra cost of custom built models. These chambers automatically maintain humidity from 20% to 95% through a temperature range of 35-185 deg. F. Minimum dew point is 33 deg. F. Common to all models, according to the manufacturer, are calibrated indicating thermostatic controllers, air circulating blowers, and stainless steel interior and exterior paneling. Four types of control are incorporated in the chambers — constant humidity, constant temperature, constant humidity and varying temperature, varying humidity and constant temperature, varying humidity and varying temperature.

Applications of these chambers include: simulation of constant or varying climatic conditions for testing electronic components, communications equipment, etc.; checking compliances with government specifications; testing corrosion in various atmospheres; determining resistance of paints, plastics, and other materials to corrosive climatic conditions. Tenney Engineering, 26 Avenue B, Newark 5, N. J.

•

### LABORATORY SAFETY

Six-page leaflet tackles the problems peculiar to laboratory safety in a clear-cut, easy-to-read manner. Fisher Scientific Co., 717 Forbes St., Pittsburgh, Pa.

**FLATTENS THE FINISH**

**. . . *INCREASES MILL ROOM CAPACITY.*** SYLOID 308 is a finely-sized synthetic silica of extremely high purity designed to produce a lower gloss finish. Less flatting agent is required . . . mill room capacity is often doubled. Rigid production controls insure a uniform product for uniform results.

SYLOID 308 gives superior results at lower cost. Great savings are gained in the mill room because Syloid mill bases can be made highly concentrated . . . with a very short grinding time. There is no mill base seeding.

For additional information or help on a specific problem write Davison's Technical Service Department.

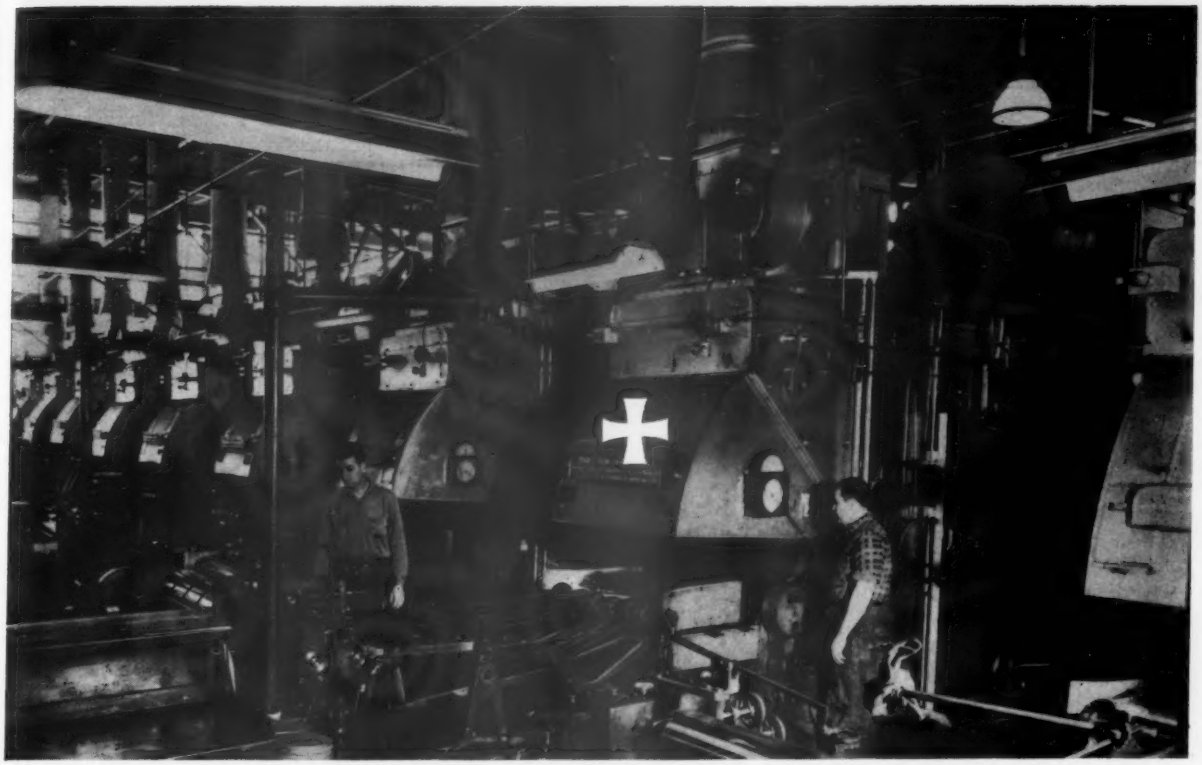
*T. M. Reg. Applied For

*Progress through Chemistry*

THE DAVISON CHEMICAL CORPORATION

*Baltimore 3, Maryland*

PRODUCERS OF: CATALYSTS, INORGANIC ACIDS, SUPERPHOSPHATES, PHOSPHATE ROCK, SILICA GELS, SILICOFLUORIDES AND FERTILIZERS



Modern equipment like these drying ovens helps Continental lithographers do a superior job

# MARKS ONE OF THE REASONS WHY CONTINENTAL LITHOGRAPHY IS TOPS!

It's a fact that Continental is one of the few steel container manufacturers that also make tin cans. And for many years we've been "decorating" a goodly percentage of both.

What does this mean to you? Simply that we have an experience in lithographing-on-metal that's hard to equal. Our volume production of lithographed containers enables us to employ top notch craftsmen. And we provide them with the most modern photographic apparatus, presses and other equipment.

The next time you need steel containers for bulk products—and want them to be as handsome as they are sturdy—why not call on Continental. Let us show you how

our Tailor-Made Service can exactly fit your needs.

## CONTINENTAL CAN COMPANY

Continental Can Building, 100 E. 42nd Street, New York 17, N. Y.

EASTERN DIVISION
100 E. 42nd St., New York 17

CENTRAL DIVISION
135 So. La Salle St., Chicago 3

PACIFIC DIVISION
Russ Building, San Francisco 4

## NEW PRODUCTS

### ACRYLIC EMULSION
**Dispersed in Water**

Rhoplex AC-33, a 100 percent acrylic dispersion in water, possesses the following advantages, according to the manufacturer: simplicity of formulation without requiring protective colloids, viscosity stabilizers or preservatives; excellent stability, including compatibility with many pigments, freedom from putrefaction, and resistance to freezing and thawing; ease of application; faster drying and quick recoating; good adhesion, good color and color retention; easy removal of stains, good scrub resistance after overnight dry.

This emulsion is supplied as a 46 percent solids dispersion in water. Its specific gravity is 1.04 and the pH, 9.0 to 9.5. The resin itself is fully polymerized; its films dry by evaporation of water. Rohm & Haas Co., Washington Sq., Philadelphia 5, Pa.

MINE SAFETY
### DETECTOR
**For Aromatic Hydrocarbons**

Instrument measures atmospheric concentration of aromatic hydrocarbons — benzene, toluene, xylene, and is used to good advantage in maintaining safe working conditions. Circular 757, from the Scientific Association of National Paint and Varnish and Lacquer Association, 1500 Rhode Island Ave., Washington 5, D. C., describes the use of this instrument in detail. This detector is available from the Mine Safety Appliance Co., Pittsburgh, Pa.

### HIGH BOILING PHENOLS
**For Thermosetting Resin Synthesis**

This product is a semi-refined mixture of short-chain alkyl substituted phenols with a distillation range between 230 deg. and 270 deg. C.

Compared with phenolic materials of similar boiling range derived from other sources, High Boiling Phenols has a high degree of meta substitution. This gives it greater reactivity with formaldehyde in the synthesis of thermosetting resins. Such resins can be made from High Boiling Phenols alone without the addition of m-cresol or phenol.

Its general reactivity suggests the use of High Boiling Phenols as an intermediate in the manufacture of phenolic resins (particularly for surface coatings that have superior chemical, alkali, and soap resistance), phenolic dyestuffs, and in chemical syntheses where ring substitution on a phenol is indicated. Carbide and Carbon Chemicals Co., Div. of Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y.


CUT COSTS! Get high-speed, trouble-free production with

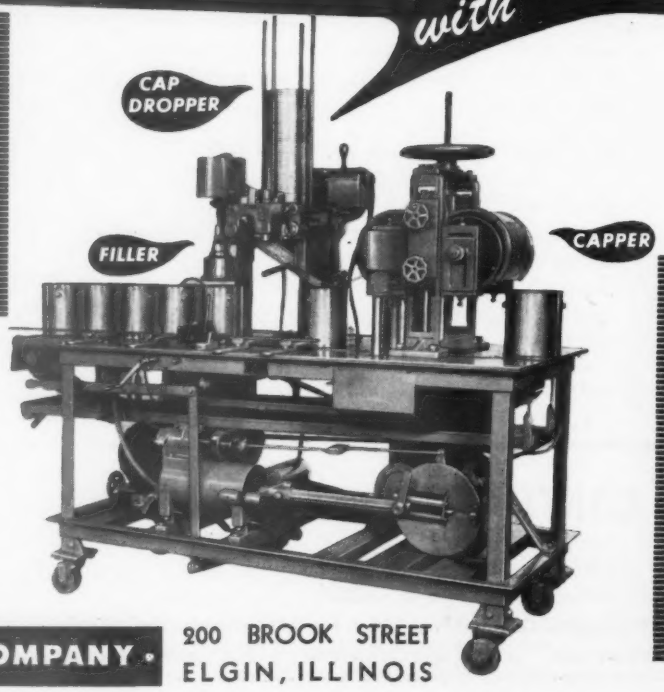
Elgin EARNS ITS WAY

MODEL 'H'

Paint Filler with Cover Dropper & Capper

The Elgin Model 'H' fills oil and water base paints, places covers, and seals all sizes of cans with double friction covers (1/32 gal. to 1 gal.) — *completely automatic.* Quick changeover and ease of cleaning are additional features which account for the popularity of the Model 'H' in both large and small plants.

*Write Today for New Folder illustrating Elgin Equipment — Address Dept. VA*




ELGIN MANUFACTURING COMPANY • 200 BROOK STREET ELGIN, ILLINOIS

# This Little Kitchen went to Market

**and bought paints based on . . .**

# Marbon "9200"

*Soluble High Styrene Paint Chips and Paint Resin*

## Every Paint Manufacturer's Answer for Gloss and Semi-Gloss Interior Finishes

Kitchens and bathrooms enjoy high permanency of gloss and brightness, plus grease-proof and moisture resistance. Marbon "9200" makes for fast application with brush or roller; provides odorless vehicle solids — (no lingering odor); no skinning in the can or settling; controlled viscosity — four viscosity grades of Marbon "9200" eliminate pigment changes for adjustment of paint body.

**Particularly Easy to Manufacture from Pigmented chips!**

Marbon

## MARBON CORP.

**GARY, INDIANA**

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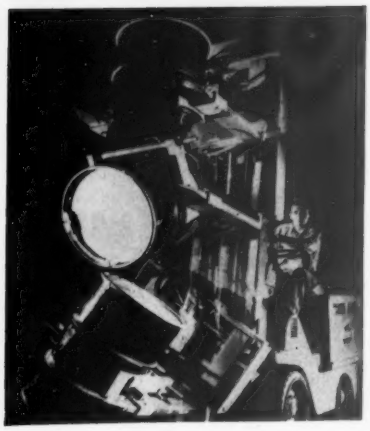
## NEW PRODUCTS



BAKER-RAULANG

### FORK LIFT TRUCK
**4,000 lb. Capacity**

Fork lift truck is outfitted with a special carriage and attachments to handle nearly a dozen different loads. Known as the "Octopus", this unit can handle ordinary pallet loads, hauls and stacks drums, empties drumloads of bulk material by hydraulically tilting drums in a vertical plane, etc. This fork truck is a standard battery-powered unit which uses four attachments: a revolving head (semi-permanent), drum clamps, hydraulic drum upender and clamp-spikes (all detachable in 2 minutes). The Baker-Raulang Co., Baker Industrial Truck Div., 1230 W. 80th St., Cleveland 2, Ohio.

### VINYL ACETATE
**Water-Soluble**

Polymer C-3 is a modified, water soluble vinyl acetate resin. The resin is normally insoluble, but becomes soluble on addition of a very small amount of alkali or ammonia. According to the manufacturer, these resins are stable at elevated temperatures. It is reported that this resin is a good thickening agent and emulsifier for synthetic polymer and copolymer dispersions.

Suggested applications include coatings, adhesives, and a binder for paints and printing inks. Three viscosity grades are offered. For full data on these particular resins write to Monsanto Chemical Co., Plastics Div., Springfield, Mass.

### VISCOSITY SYSTEMS
**Automatic Measurement**

Model MP Multi-Probe Ultra-Viscon system is used for continuous, automatic viscosity measurement to 650 deg. F and 1,000 psi pressure up to 16 probe stations. Hermetically sealed ultrasonic probes (the size of a fountain pen) having no moving parts, are installed permanently in up to 16 kettles or pipe lines. One Ultra-Viscon computer and multiplex unit located up to one mile from probes indicates viscosity measured by any desired probe, or automatically records viscosities singly or in sequence on standard multipoint industrial recorders. Useful in the production and application of resins, adhesives, inks, paints, and coatings. The Ultra-Viscoson Corp., 1240 Main St., Hartford, Conn.

### WAX-LIKE POLYMER
**For Formulating Paint**

Low-molecular-weight, polyethylene waxes, called "Alcowax" can be used for formulating paints and varnishes, ink, etc., it is reported. Product will be made from ethylene, which in turn is derived from coal-tar sources. Allied Chemical & Dye Corp., Semet-Solvay Division, 52 Vanderbilt Ave., New York, N. Y.

proved better on 4 counts:

- Permanence (longer-lasting beauty)
- Efficiency (less plasticizer for same hardness)
- Flexibility (better resistance to cold-checking)
- Quick drying time (faster production schedules)

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• Valuable information compiled by our laboratories is now available to you. It will show you with actual data why FLEXOL plasticizer 4GO was found to be the best general-purpose nitrocellulose plasticizer of them all. Any of our sales offices will be glad to provide you with this information. Call or write today!

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*If your whites are laboratory problems . . .*

# Neo-Fat® 140 gives you whites that stay white

Neo-Fat 140 (formerly 3R) is an improved unsaturated fatty acid material, produced under exacting quality control by a new low temperature solvent crystallization process. When used in the formulation of alkyd resins, it gives faster drying and non-yellowing coatings. Its lower titer means this chemical can be exposed to temperatures as low as 5°C. without the slightest solidification. Neo-Fat 140's high iodine values and low saturated fatty acid content yield more double bonds per gallon of fatty acids, contributing better dry and harder films to alkyd resins.

Faster processing time and brilliant color, which carries over into the finished product, are other important advantages of this improved chemical. Neo-Fat 140 has the following specifications: titer, 5°C. max.; iodine value of 140 to 143; color, 2 Gardner max.; acid value of 197 to 202; maximum unsaponifiable content 0.5%; and moisture, 0.2% maximum. Average composition is: 44% oleic, 55% linoleic, 1.0% linolenic maximum. Write today for technical bulletin A-1, which gives complete information and formulas on Armour's Neo-Fat 140.

ARMOUR CHEMICAL DIVISION

1355 W. 31st Street • Chicago 9, Illinois

C. J. Krueger

### Pittsburgh Plate Production Men Hold Paint Conference, Feb. 2-4

Thirty production supervisors and technicians from thirteen Pittsburgh Plate Glass Company paint plants in the United States and Canada met in Detroit, February 2-4, for a series of sessions involving paint production problems, procedures, and developments.

The conference held at the Detroit-Leland Hotel, was held under the supervision of Clarence J. Krueger, production manager of Pittsburgh Plate's paint division.

•

### Safety Solvent Firm Expands Distribution

John B. Moore, president of John B. Moore Corporation at Nutley, N.J., announced recently that warehouse stocks of the firm's safety solvents have been installed in Pittsburgh, Pa. and Detroit, Mich.

The firm produces their solvent products at Clifton, New Jersey.

Also announced were the appointments of the following sales representatives: Norman M. Gottfried, for the western Pennsylvania, western Virginia, and western New York State areas; Caldwell Chemical Co., Inc., of Detroit, Mich., for the state of Michigan; and the Arthur K. Meyer Company, for the West Coast. The Meyer Company will also manage Moore's West Coast offices at 1206 S. Maple Ave., Los Angeles, Calif.

### Volney R. Croswell, Pioneer In Naval Stores Field, Retires

Volney R. Croswell, a pioneer in the naval stores field and a veteran of nearly 41 years' service with the Hercules Powder Company, Wilmington 99, Del., retired recently.

Mr. Croswell, manager of safety for three Hercules departments, Naval Stores, Paper Makers Chemical, and Synthetics, has served in a managerial capacity at five Hercules plants.

In addition, he has been the author of numerous articles on industrial safety and naval stores in a wide range of trade publications.

Mr. Croswell began his career with the du Pont Company in 1912 as a chemist at the firm's Eastern Laboratory, Gibbstown, N. J.

The same year he was transferred to Hercules, Calif., remaining there as a chemist until 1915, during which time the plant became part of the Hercules Powder Company. In 1915 he became chief chemist at Bacchus, Utah.

•

### Maleic Anhydride and Fumaric Acid Symposium Scheduled Mar. 11

A symposium on maleic anhydride and fumaric acid, of which the paint and varnish industry is one of the largest consumers, has been planned by Benjamin Farber, chairman of the Vehicle Manufacturers Group of the New York Paint, Varnish Lacquer Association, together with Oscar P. Muller, head of the Arrangement Committee.

The meeting will be held March 11, at 6:30 p.m., at the Hotel Brevoort in New York City.

Three speakers have been invited to talk on the two chemicals extensively employed in the manufacture of modified-drying oils and various types of alkyd resins used in the production of different enamels.

Lawrence H. Flett of the National Aniline Division, Allied Chemical & Dye Corporation, will discuss the maleic anhydride industry and point out some of the basic chemical reactions which take place with maleic anhydride and fumaric acid.

Dr. William Howeltt Gardner, of the same firm, will describe the chemistry of the new copolymer alkyd resins such as the styrene modified "carbic" anhydride types and the unsaturated polyester types which depend on heat or catalysts for drying. The latter are now widely used in the manufacturer of laminated glass-reinforced plastics.

Dr. Alexander Schwarchman of Spencer Kellogg & Sons ,will discuss the use of maleic anhydride in drying oils and their effect on paint vehicles.

### Chairmen Appointed For a Number of FPVPC Committees

Gustave H. Wescott, newly elected president of the Federation of Paint and Varnish Production Clubs, has named the chairmen of a number of the FPVPC Committees.

The Committee chairmen selected are: American Paint Journal Award, A. C. Eide; By-Laws, Robert J. Smith, CDIC; Contract Bridge Tournament, Sidney Werthan, Philadelphia; Educational, Milton A. Glaser, Chicago; Ernest T. Trigg Award, W. V. Jones, Houston; Finance, Hiram P. Ball, Pittsburgh; George B. Heckel Award, William T. Thies, Kansas City; Golf, John S. Ayres, Detroit; Liaison, Robert W. Matlack, Philadelphia; Meetings, Howard G. Sholl, Baltimore; Membership, Fred C. Damitz, New York; Memorial, Edwin L. Gott, Southern; Nominating, Hiram P. Ball, Pittsburgh; Paint Industries' Show, Hugh A. McConaghie, Philadelphia; Program, Eugine H. Ott, Cleveland; Publications, Philip J. Whiteway, Jr., Philadelphia; Publicity, Francis J. Rogers, New York; Research, Paul O. Blackmore, New York; Scientific Section Advisory, Ralph H. Everett, New York; Standards & Methods of Test, Maynard R. Euverard, New York; Materials, Herbert L. Fenburr, CDIC; Mattiello Lecture, Verne C. Bidlack, Philadelphia.

•

### English Paint Company Joins Colorizer Associates

Jenson & Nicholson, Limited, of London, England, has become the fourteenth member of Colorizer Associates, Inc., according to a recent announcement by President Robert O. Clark at the Annual Directors' Meeting of Colorizer Associates held at the Hotel Sherman in Chicago.

Founded in 1821, Jensen & Nicholson are one of England's two largest paint companies.

Sales and manufacturing executives of the English firm visited most of the plants of the American and Canadian Colorizer Associates, as well as several other American paint concerns, before deciding to sponsor the System in the British Empire.

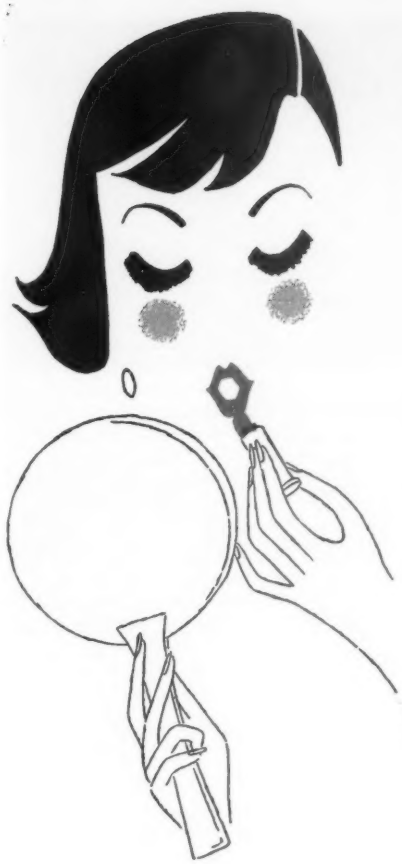
Colorizer Associates also announced that a new Colorizer latex paint would be marketed soon.

•

### C. J. Osborn Appoints Sales Agents for Texas

The C. J. Osborn Company of New York City, has appointed the Eltex Chemical Company, 119 Main Street, Houston, Texas as their sales agents in Texas for synthetic resins and pigments.

A. M. Russell, head of the Eltex firm, has been in the synthetic resin field for 20 years.



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That's why they prefer TITANOX titanium-calcium pigments. For these pigments embody the most efficient and reliable combination of titanium dioxide with extender . . . and in different types of pigment to meet different needs:

TITANOX-RCHT (30% $TiO_2$; general purpose)
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1481

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*the brightest name in pigments*

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*Subsidiary of* NATIONAL LEAD COMPANY

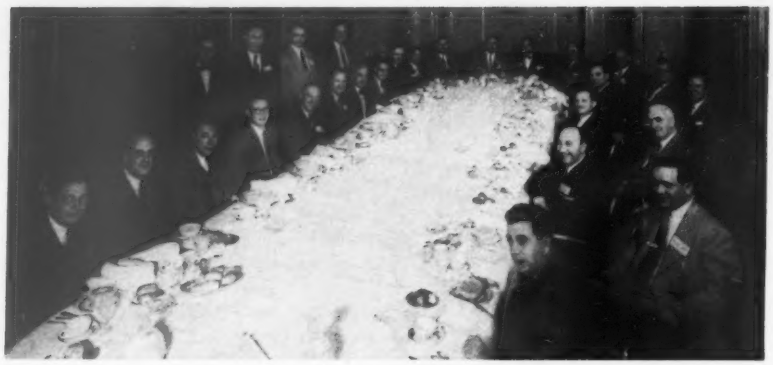
## Edgar Brothers' Distributors Hear 1953 Plans at Luncheon

Distributors of the Edgar Brothers Company, attending a company luncheon recently, heard a 1952 progress report and the firm's plans for the coming year.

Dr. C. G. Albert, Edgar Brothers Director of Research, reviewed products with special stress on new applications.

Later the firm's new products were introduced and discussed by Mr. Peyton Wheeler of the Research Department.

A. G. Blake, vice president at Edgar Brothers reviewed past efforts before proceeding with 1953 plans.



Edgar Brothers' Distributors Luncheon

Distributor representatives attending the show were; Standing, left to right: R. W. Johnson, Pigment & Chemical Co., Ltd., Toronto, Canada; William B. Tabler, William B. Tabler Co., Louisville, Ky.; James B. Tabler, William B. Tabler Co.; Peyton Wheeler, Edgar Brothers Co., McIntyre, Georgia. Seated, left to right: John Porter, Southern States Chemical Co., Atlanta, Ga.; Donald Hurley, Benlo Chemicals, Milwuakee, Wis.; Lloyd B. Greiner, Benlo Chemicals; Robert D. Struthers, Benlo Chemicals; Julius Loeffler, Commerce Petroleum Co., Chicago, Ill.; James M. Brandt, George C. Brandt Inc., Kansas City, Mo.; M. D. Beck, Commerce Petroleum Co.; John H. Colbeck, J. W. Stack Co., Detroit, Mich.; George C. Brandt, Jr., George C. Brant, Inc., St. Paul, Minn.; Eli Camiy Cia, S. A. Mexico City, Mexico; Jamie C. Beard, Barada & Page, Inc., Oklahoma City, Okla.; O. E. Hempel, Edgar Brothers Co., Metuchen, New Jersey; A. C. Mueller, A. C. Mueller Co., Cleveland, Ohio; C. Gerald Albert, Edgar Brothers Co., McIntyre, Georgia; J. W. Stack, J. W. Stark Co., Detroit, Mich.; L. C. Brandt, George C. Brandt, Inc.; Benjamin Joachim, Superior Materials, Inc., New York, N. Y.; J. A. Cullen, Independent Oil Co., St. Louis, Missouri; J. M. Harris, Commerce Petroleum Co.; E. Kaberna, Commerce Petroleum Co.; and Robert Wilkerson, Kenyon-Baker, Newark New Jersey (Edgar Brothers' Advertising Agency).

## Symposium on Gloss Measurement Held at Mar. 4 Meeting of ASTM

A Symposium or Gloss Measurement featured the 1953 Spring Meeting of the American Society for Testing Materials held at the Hotel Statler in Detroit.

Comprised of several papers by leading technical men in this field, the Symposium was sponsored by the ASTM Committee E-12 on Appearance.

The Symposium was presented in two sessions on March 4. The morning session was comprised of two papers: *Surfaces as Seen and Photographed*, and *The Physics of Surface Reflection*.

Both papers dealt with the psychological aspects of the problem of gloss measurement and its physics.

The problem of bringing these two aspects of gloss measurement together was discussed in a paper *Gloss and Its Measurement* by Richard Hunter in the afternoon session.

The balance of the afternoon session was devoted to discussion. Deane B. Judd of the National Bureau of Standards presided at the meeting.

Committee E-12 also prepared an exhibit in connection with specific gloss problems.

•

## Dolan & Co. Constructing Addition to their Plant

The V. J. Dolan & Company is constructing an addition to their plant at 1830 N. Laramie Ave., Chicago, Ill.

The new structure will house the firm's latest equipment for the manufacture of lacquer and synthetic enamels for wood and metal.

## ACS Paint and Plastic Div. Announces March Program

*Monday Morning and Afternoon, Mar. 15, 1953-Symposium on Fire Retardant Paints — Mark W. Westgate, Presiding*

Mark W. Westgate-Introductory Remarks
George S. Cook-The Value of Fire Retardant Paints
H. A. Schuyten, J. W. Weaver, and J. David Reid-Some Theoretical Aspects of Flameproofing of Cellulose
Joseph R. Yockers-The Effectiveness of Fire Retardant Paints in Fire Prevention. Alice C. Weil, George W. Mod, and A. Watson Chapman-Fire Retardant Coatings on Acoustical Surfaces and Test Methods for Their Evaluation
T. M. Murray, Felix Liberti, and Austin O. Allen-Practical Aspects of the Formulation of Fire Retardant Paints
Robert Grubb and Walter W. Granmer-Testing Fire Retardant Paints Under Simulated Service Conditions Harold W. Lasch and Elmer E. Jukkola-Fire Retardant Coatings for Aircraft Use John C. Zola-High Heat- and Flame-Resistant Mastics

*Tuesday Morning and Afternoon, Mar. 16, 1953-General Papers — Arthur K. Doolittle, Presiding*

F. K. Daniel-Pigment Milling Without Binder
R. Denning and F. K. Daniel-Effect of Surface Active Agents on Pigment-Vehicle Systems
Linus Pauling-Configuration of Polypeptide Chains in Proteins

H. R. Gamrath, R. E. Hatton, and W. E. Weesner-Chemical and Physical Properties of Alkyl Aryl Phosphates
B. G. Brand, A. D. Sill, and E. R. Mueller-Effect of Excess Polyol on Maleic Alkyd Preparation

*John K. Wise, Presiding*

L. Reed Brantley, Reginald Stabler, and Kenneth Bills, Jr.-Method of Removal of Coating by Adherometer and Improvement in its Design
Ray V. Lawrence and W. E. St. Clair-Fused Metal Resinates from Aldehyde Modified Rosin
J.S. Stinson and Ray V. Lawrence-Thermal Isomerization of Rosin

*Wednesday Morning, Mar. 17, 1953-Symposium on Plastics and Finishes for Aircraft — Allen L. Alexander, Presiding*

Allen L. Alexander-Introductory Remarks R. Battle and P. J. Stayboldt-Sealing Aircraft Integral Fuel Tanks
J. R. Panek, J. S. Jorczak, and H. Colon-Air Drying Polysulfide Rubber Paint Films A. L. Alexander, J. E. Cowling, and Peter King-Temperature Indicating Paints
J. W. Marchbank, D. M. Gans, E. D. Mitchell, F. E. Piech, and W. O. Bracken-Hot Spray Finishes for Aircraft
Harold Rosenbloom-The Chemistry of Walsh Primers
J. Otis Laws-Properties Required of Adhesives Used in Aircraft Honeycomb Sandwiches

The National Paint, Varnish and Lacquer Association and the Federation of Paint and Varnish Production Clubs have jointly announced that their respective conventions will be held during the week of October 25th in Atlantic City, N. J. with headquarters at the Chalfonte-Haddon Hall. The National Association will meet first, holding its Convention on Mon., Tue., and Wed., October 26, 27, and 28, 1953. The Federation will hold its Annual Meeting on Thur., Fri., and Sat., Oct. 29, 30, and 31, 1953. The Paint Industries' Show will open Tues., Oct. 27th and close Fri., Oct. 30th.

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## Barnard Botanist on Leave; Will Test Paints in Tropics

Dr. Donald D. Ritchie, chairman of the Botany Department at Barnard College, New York, N.Y., will take an eighteen month leave of absence to be director of the Naval Research Laboratory Tropical Exposure Station in the Canal Zone, Panama.

Professor Ritchie will direct research teams in testing paints, fabrics and insulating materials in order to study the effects of tropical exposure, weather and moisture on the growth of fungi which cause great losses in the tropics.

He is scheduled to return to Barnard in September 1954.

## NEWS OF PAINT AND VARNISH PRODUCTION CLUB MEETINGS

### New York

Robert L. Terrill of Spencer Kellogg and Sons, presented a talk on *Improved Drying Oils* at the regular monthly meeting held February 5.

Mr. Terrill presented a brief review of some of the chemical aspects of modified drying oils. Recent work has shown that thermal polymerization of oils is due primarily to an addition polymerization with less emphasis on condensation polymerization. The shift under heat of unconjugated double bonds to the conjugated position sets up a condition favorable for a diene reaction to occur between two fatty acid radicals. The result being a six numbered cyclic group uniting two fatty acid chains of the same or different glycerides. The classical theory held that the attack by oxygen was at the double bonds with the formation of cyclic peroxides, which could further react to form various types of oxygen containing rings between chains. However, the decrease in unsaturation for nonconjugated oils was never found to be equivalent to the amount of oxygen consumed. More recent work by investigators points to a hydroperoxide formation at the alpha-methylene group as the actual reaction.

From a technical standpoint modifications of drying oils can be grouped into three broad classifications. First, chemical of physical segregation yielding relatively pure fractions having specific properties. Second, catalytic, chemical and/or thermal reaction to change the molecular structure. Third, functional modification can be accomplished by additive or condensation reactions with other reactive materials.

In the first grouping, oils have been separated into fractions having different degrees of unsaturation through the use of solvents. Liquid propane and furfural are typical solvents employed. However, the solvent method is limited in its fractionation possibilities by the mixed nature of the natural vegetable triglycerides.

Molecular distillation is primarily confined to the food industry because of economic considerations. In the case of fatty acids fractional distillation may be employed to separate the various types. In addition there are two solvent crystallization processes in use for separating fatty acids, Chemical processes, such as by urea complexing are under consideration.

In the second group of modified drying oils there is some alteration of molecular structure, configuration or composition effected by a thermal or catalytic change but without addition of condensation of another component.


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FROM COLOR TO CLEAR

FROM ONE LOCATION TO ANOTHER...

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### Plan To Increase Domestic Castor Oil Output, Approved by US DA

A 1953 program for the domestic production of castor beans has been authorized by the U. S. Department of Agriculture, at the request of the Munitions Board.

The program calls for the planting of 125,000 acres, of which 35,000 acres will be on irrigated land and the remainder on dry land.

The plan is designed to increase supplies of castor oil for defense purposes and to gain further experience in the domestic production of castor oil.

The Commodity Credit Corporation will carry out the program which will be made available to farmers who enter into contract with the CCC directly or with other groups under contract with the CCC, private companies, and farmers cooperative associations, in areas within states designated by the CCC and for which adapted planting seed is available.

These states include Arizona, Arkansas, California, Oklahoma and Texas.

The price to be paid the farmers participating in the program will be the higher of 9 cents per pound, hulled basis, or the market price at the time of delivery.

For the 1951 and 1952 crops the price was ten cents per pound, hulled basis, or the market price at time of delivery.

The CCC will finance the program, but losses, if any, will be reimbursed from funds made available to the Secretary of Agriculture under the Defense Production Act of 1950.

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### Short Course on Paint Selection Scheduled March 30 to April 1st.

A second short course in the Fundamentals of "Paint and as an Engineering Material", sponsored by the Case Institute of Technology Cleveland, Ohio, will be held March 30th to April 1, at the Institute.

The course will consider some of the more important details which qualify the decisions of the coatings engineer in the selection and application of organic protective finishes. The background for discussion will be outlined by a speakers' panels.

Topics that to be considered are as follows:

*Metal Protection in Severely Corrosive Environments.*

*Special Problems of Paint Application*: (A) Factors which influence the adhesion of organic coatings, (B) Causes and remedies of other paint application faults.

*Testing of Organic Coatings*: (A) Design and interpretation of experiments for field or service testing, (B) Accelerated laboratory tests for prediction of service properties of coatings

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### Innes Corp. Appoints Philadelphia Firm Gum and Rubber Sales Agents

The O. G. Innes Corporation, 82 Wall St., New York, N.Y., has appointed Van Horn, Metz & Company, 509 Noble St., Philadelphia, Pa., as sales agents for gum and rubber in Philadelphia, Baltimore and the surrounding territory.

R. O. Innes, vice president of the Innes Corporation, made the announcement.

### American Oil Chemists' Society To Meet May 4-6, in New Orleans

The 44th Annual Meeting of the American Oil Chemists' Society will be held at the Roosevelt Hotel, New Orleans, Pa., May 4-6.

J. A. Kime will be chairman of the meeting. He will be assisted by Mrs. C. S. Fisher, T. H. Hopper, C. L. Hoffpauir, J. J. Ganucheau, W. S. Sinngleton, R. M. Persell, A. F. Freema and E. A. Gastrock.

A new pigment mixing and grinding aid for the Paint Industry
TENLO-70
When they want delivery "yesterday"...
If your Sales Department throws peak-loads on your mixing and grinding equipment by promising immediate delivery on large special-orders for industrial finishes, you NEED the advantages offered by Tenlo-70!
Tenlo-70 reduces mixing and grinding time by as much as 50% through faster pigment dispersion. This means faster delivery for customer-satisfaction.
Write, today, for a generous gallon sample—enough to run laboratory tests and make a trial plant batch. Full technical data is also yours on request.
PROPERTIES OF TENLO-70
Color—Amber • Form—Liquid
Pounds per gallon—8.23
Active Material—100%
GRIFFIN CHEMICAL COMPANY
1000 16th STREET, SAN FRANCISCO 7, CALIFORNIA
Los Angeles
Plant: Richmond, California

Isomerized oils, catalysed oils, interesterified oils, dimerized fatty acids and dehydrated castor oil belong in this grouping. Isomerized oils have not been used extensively in this country because of technical and economic considerations. However, similar results can be obtained by the widely used catalysed oils. Interesterified oils, such as the formerly popular chinawood-soya combination, are produced by first allowing an ester interchange to take place between the oils at a moderate temperature before taking up to bodying temperature.

Dimerized fatty acids are the principal product produced by heating polyunsaturated fatty acids under pressure in the presence of water. By distillation the monomer fatty acids remaining can be removed. The dimerized acids thus produced can be heat bodied with soft oils such as soya plus enough polyhydric alcohol for esterification.

The dehydration of castor oil is carried out at elevated temperatures in the presence of catalysts such as sulfuric acid sodium bisulfate or organic sulfates.

It is in the third group, according to Mr. Terrill, that we find some of the improved drying oils which have proven to be economic and of the utmost importance technologically. This group includes the oils that have been modified functionally by addition, copolymerization or condensation reactions. The modifiers include the higher alcohols, maleic anhydride dicyclopentadiene and styrene. The higher alcohols usually used are pentaerythritol, dipentaerythritol and sorbitol. Soya fatty acids, for example, esterified with penta will have non-yellowing properties similar to linseed.

In the maleic modified oils the reaction in the case of conjugated oils takes place according to the familiar Diels-Alder Mechanism and with non-conjugated oils the result is an alkenyl succinic acid anhydride.

In the copolymerization group dicyclopentadiene is the only one of a series of related compounds used commercially. These dicyclopentadiene treated oils have found wide acceptance because of their compatibility with other drying oils and coating materials in general. They can also be further heat processed in the varnish kettle to make a host of products possessing good alkali and water resisting properties.

Styrenated oils have been used to a greater extent in England than in our country where the interest has been stronger for the styrenated alkyds. The styrenated non-conjugated oils have only recently become available commercially and are intended for use as oil modifiers in phthalic alkyds. Styrenation oxidized oils are characterized by extremely rapid set and drying time with excellent water and alkali resistance. Lack of compatibility and poor application characteristics have limitied their general use. The high cost of natural or synthetic conjugated oils has limited the commercial application of the styrenated conjugated oils in this country.

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### Harmon Color Works Becomes Part of B. F. Goodrich Chemical Co.

The Harmon Color Works, a division of the B. F. Goodrich Company, Cleveland Ohio, has become a part of B. F. Goodrich Chemical Company.

Orville E. Isenburg, formerly international sales manager for Goodrich Chemical, has been appointed sales manager for Harmon Color.

Victor Chartrand, formerly president of Harmon Color, will join the Chemical firm as an advisor in the field of organic color sales.

Manufacturing and technical activities for Harmon Color will continue under the direction of H. T. Madden and Vincent Vesce, respectively.

Harmon organic colors will continue to be manufactured at Haledon and Kearny, N.J., and sales headquarters will be located in Cleveland, at the general offices of Goodrich Chemical.

The Harmon Color Works was purchased by the Goodrich Company in 1950.

**SA-510**
ALKYDRESIN SOLUTION

Solids Content.....40%
Acid Number.....2-5
Color (Hellige).....3-5
Specific Gravity.....880-890
Viscosity (Gardner)....Y-Z,
Solvent...Odorless Petroleum Spirits
Also available in regular Petroleum Spirits thinner.

**SA-6727**
ALKYD RESIN SOLUTION

Solids Content.....65%
Acid Number.....2-4
Color.....6-7
Specific Gravity.....920-930
Viscosity (Gardner)....W-Z
Solvent...Petroleum Spirits

**Schenectady SA-510 and SA-6727 pure alkyd resins enable you to meet all requirements in flat finishes. Both resins produce thixotropic paints with excellent brushing properties and superior non-penetration (especially in difficult deep tones). Color retention is tops, too, as both resins are pure alkyds and free of rosin. Write us or call your local Schenectady Representative for full details.**

SCHENECTADY RESINS
(Division of Schenectady Varnish Co.)
200 Congress St., Schenectady 1, N. Y.

IN CANADA:
Paisley Products of Canada, Ltd., Toronto 4, Canada

EXPORT DISTRIBUTORS:]
Binney & Smith International Inc., New York 17, N. Y.

ANOTHER SCHENECTADY RESIN

MANUFACTURERS OF PHENOLIC, ALKYD, MALEIC AND TERPENE RESINS FOR ALL NEEDS

### Nuodex Moves Executive Offices to 1 Virginia St., Newark, N.J.

Sales, executive and administrative offices of the Nuodex Products Company, Inc., manufacturers of chemical additives, have been moved from Elizabeth, New Jersey to new quarters at 1 Virginia St., Newark, N.J.

The move was undertaken in the interest of better service to customers by consolidating operating functions under one roof, according to Leo Roon, president of the firm.

In addition to the sales and order departments, advertising, accounting and purchasing personnel have been transferred to Newark as have been the offices of Mr. Roon, Arthur Minich, executive vice-president, and Donald Roon, marketing vice president.

The Research Laboratories, under the direction of Dr. John R. Skeen, including the technical service laboratories, are being centralized in the Nuodex Research Building, 1075 Magnolia Ave., Elizabeth. This building, now in the process of reconstruction, will be ready by April 1st.

The main Nuodex plant remains at 830 Magnolia Ave., Elizabeth, along with the Control Laboratory and the offices of Walter Gotham, production vice president.

•

### Atlas Powder Co. Acquires 45 Acre Tract for New Office

The Atlas Powder Company, Wilmington, Del., has announced the purchase of a 45 acre tract, about 4 miles north of Wilmington on U.S. Route 202, for the construction of a new office.

Although plans for the structure are not yet completed, it is expected to house the 400 employees of the various administrative departments of Atlas who are now located in downtown Wilmington.

Completion and occupancy is expected within three years. No laboratory or manufacturing activities will be moved to the new building.

The tract affords access from the Concord Pike, and extended frontage along New Bridge Road, now under construction. The structure to be erected will not exceed three stories.

### Vibrin Resin Coating Used To Protect $8,000,000 Cosmotron

A thin coating of Vibrin polyester resin is being used to help protect an 8 million dollar investment.

The valuable investment is the giant cosmotron at Brookhaven National Laboratory, Upton, N.Y., being used in atomic research.

Because the cosmotron is a delicate piece of machinery, it is necessary that it be protected from damage by abrasive particles from the massive concrete radiation shields that surround it.

The shields, used to protect researchers from radiation, are made up of a series of 10-ton concrete blocks stacked four tiers high and surrounding the cosmotron for more than 100 feet around its circumference.

To prevent the shields from causing dust, a 1/32 inch coating of Vibrin was placed over the cement blocks.

The coating, a product of the Naugatuck Chemical Division, United States Rubber Company, is extended with calcium carbonate and a pigment to give the blocks a grey color.

According to the company, Vibrin is quick-drying and won't flake off even under a weight of 40 tons.

● Blackmer Rotary Pumps are self-adjusting for wear. When the vanes finally wear out, change them, without disturbing piping or drive, and you save the cost of a new pump!

BLACKMER
The Lifetime Pump
10 TO 1500 GPM
Positive Displacement

Get the facts

See how Blackmer Pumps handle light or viscous liquids efficiently—how they cut your pumping costs. Write for Bulletin 307

BLACKMER PUMP CO., GRAND RAPIDS, MICH.

Shawnee
DRY COLORS
"Color Content Guaranteed"

Chrome Greens
Chrome Yellows
Molybdate Orange
Zinc Chromate
Strontium Chromate
Toluidine Reds
Para Reds Iron Blues
Cadmium Colors
Maroons
Lake Colors
Aluminum Stearate

*Kentucky Color also Distills*
No. 2-D Shingle Stain Oil
Dirty Solvent Recovered

Kentucky Color & Chemical Co., Inc.
General Office and Works
LOUISVILLE, KENTUCKY
Offices and Agents in Principal Cities

# Whichever way you go—

**For alkyd flats:** U.S.I. pioneered with Aroflat* 3010, which was the first pure alkyd specifically designed as the sole vehicle for flat wall finishes. This was followed by Aroflat* 3025, the first pure alkyd for use as the sole vehicle in self-sealing wall paints. Then came Aroflat* 3050, which met the demand for more economical alkyd flat paints of good quality. *All three U.S.I. Aroflat alkyds are available in either odorless or regular solvents to fit your requirements.*

**For latex paints:** U.S.I. experience and research with alkyd emulsions led to the development of the first alkyd specifically designed for latex paints—Aroplaz* 1274—which overcomes the tendency of pure latex toward poor adhesion and wet scrubability. At the same time, Aroplaz* 1274 contributes better color retention, greater freeze-thaw stability and greater latitude of pigmentation—all without increase in raw material cost of latex paint. Aroplaz 1274 is available in both odorless and regular solvents.

**Whichever way you go—alkyd flats or latex paints—odorless or regular solvents—tank cars or drums—call or write your nearest U.S.I. office for AROFLAT alkyds or AROPLAZ 1274.**

**Reg. U.S. Pat. Off.*

**U.S.I INDUSTRIAL CHEMICALS CO.**

*Division of National Distillers Products Corporation*
**120 Broadway, New York 5, N. Y.**
***Offices in Principal Cities***

# the chemist's page

**Only DMR Cobalt is free from contaminants**

**Patented Direct Metal Reaction Process:**
DMR directly reacts cobalt metal with the selected organic acid to produce pure cobalt driers without water soluble products. Cobalt driers manufactured by the patented Nuodex Direct Metal Reaction process contain no contaminating residual salts. Cobalts made by conventional processes yield water soluble $Na_2SO_4$ which cannot be completely removed from the end product because of occlusion. Impurities in cobalt driers may be troublesome.

**DMR COBALT Assures Dependability:**
This purity and uniformity of DMR Cobalt assures an extra measure of dependability that adds a safety drying factor to formulations—a worthwhile advantage in all compositions requiring cobalt. Yet this high standard of purity and uniformity is available without premium price.

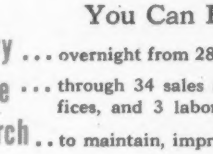
Nuodex DMR Cobalt driers are offered as naphthenates, Nuolates (tallates), or Odorex (selected fatty acids). Whichever you prefer, you can be sure of utmost purity combined with consistent, uniform and positive performance. It costs no more to use the best.

**For More Data on DMR:**
Ask your Nuodex agent for samples and our bulletin on DMR or write today to Nuodex Products Co., Inc., Elizabeth, N. J.

You Can Rely on **NUODEX** for

**Delivery** . . . overnight from 28 warehouses and 4 separate plants
**Service** . . . through 34 sales agencies, 4 technical regional offices, and 3 laboratories serving all paint centers
**Research** . . to maintain, improve and develop quality products

**NUODEX**
*Chemical Additives To Serve Industry*



**Plants at**
*Elizabeth and Newark, N. J.,*
*Long Beach, Calif.,*
*Leaside (Toronto), Ontario, Canada*
© 1953 Nuodex Products Co., Inc.

DRIERS • FUNGICIDES • MIXING & MILLING AIDS

**CONSULT YOUR NEAREST NUODEX REPRESENTATIVE**

**ALLSTON, D. H. Litter Co., Inc.; ATLANTA, R. T. Hopkins; BUFFALO, Commercial Chemicals, Inc.; CHICAGO, The Cary Company; CINCINNATI, B. H. Roettker Company; CLEVELAND, A. C. Mueller Co.; DALLAS, Thompson-Hayward Chemical Co. of Texas; DAVENPORT, Thompson-Hayward Chemical Co.; DENVER, Thompson-Hayward Chemical Co.; DES MOINES, Thompson-Hayward Chemical Co.; DETROIT, Baker & Collinson; HOUSTON, Thompson-Hayward Chemical Co.; INDIANAPOLIS, Indiana Naval Stores Co.; KANSAS CITY, Abner Hood Chemical Company; LOS ANGELES, E. B. Taylor Company; LOUISVILLE, B. H. Boyet & Company; MEMPHIS, Thompson-Hayward Chemical Co.; MILWAUKEE, R. L. Ferguson; MINNEAPOLIS, Thompson-Hayward Chemical Co.; NASHVILLE, Post Brokerage Company; NEW ORLEANS, Thompson-Hayward Chemical Co.; NEW YORK, D. H. Litter Co., Inc.; OKLAHOMA CITY, Thompson-Hayward Chemical Co.; OMAHA, Thompson-Hayward Chemical Co.; PHILADELPHIA, Harry W. Gaffney; PITTSBURGH, John D. Butts; PORTLAND, Fred E. Alsop & Co.; RICHMOND, F. V. Gunn & Co., Inc.; ST. LOUIS, J. E. Niehaus & Co.; SAN ANTONIO, Thompson-Hayward Chemical Co.; SAN FRANCISCO, Cole & DeGraf; SEATTLE, D. B. Smith; TULSA, Thompson-Hayward Chemical Co.; WICHITA, Thompson-Hayward Chemical Co.**

# Personnel Changes

A. C. Staley

R. C. Stolk

## CANCO

**Allen C. Staley, Jr.,** of San Francisco, Calif., manager of sales for the Pacific Division, has been named assistant general manager of sales. **Robert C. Stolk,** now assistant manager of sales for the Pacific Division, will succeed Mr. Staley as manager of sales. **C. W. Curry,** of Chicago, now a sales division manager for the American Can Company's Central Division, will become assistant manager of sales in place of Mr. Stolk. In his new job, Mr. Staley will assist in the direct supervision of all Canco sales activities in the United States and Canada. Mr. Stolk will direct sales activities on the West Coast, Hawaii and Alaska from the Pacific Division's headquarters in San Francisco. He joined Canco in 1933. Mr. Staley started with the firm in 1937.

## BAKER CASTOR OIL

**John Ottens** has been appointed sales representative in the firm's Chicago office. He began his career as a research chemist with Universal Oil Products. Later, Mr. Ottens joined the Witco Chemical Company as a technical representative, and subsequently became associated with the Carl A. Lechner Company.

## CHEMICAL CONSTRUCTION

**E. D. Powers** has been elected president of the Chemical Construction Corporation. He will remain as vice president and director of the parent firm, American Cyanamid Company. **Major General William N. Porter,** who had been president of Chemical Construction since 1947, was elected chairman of the board of directors. Mr. Powers, who has also been elected a director, and member of the executive committee of Chemical Construction, has been with American Cyanamid since 1918.

## EMERY INDUSTRIES

**John D. Farr** has been appointed to the development and service department. In his new capacity, Mr. Farr will be concerned with development and technical service activities pertaining to Emery's Plastolein Plasticizers.

## G-E

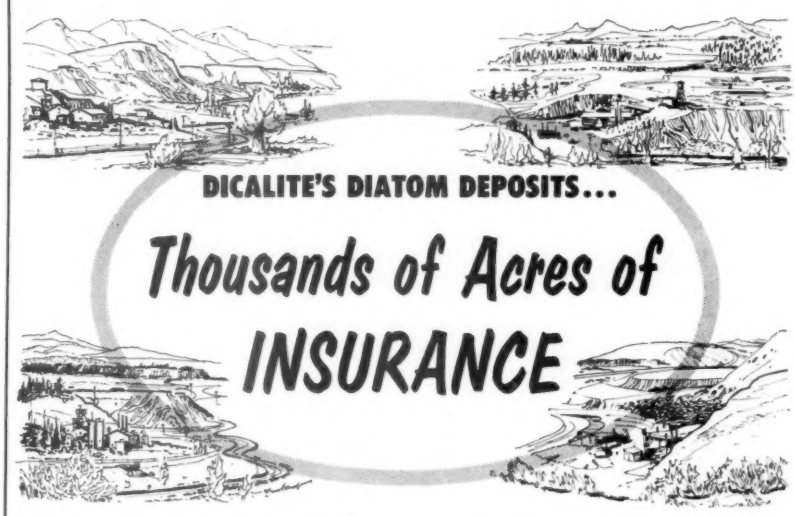
**C. L. Chase** has been promoted to sales development supervisor for phenolic resins and varnishes. He will be responsible for the commercial development of G-E laminating, industrial, and foundry resins. Mr. Chase joined the firm in 1947, enrolling in G-E's scientific training program. For the past two years he was in charge of sales development for General Electric's R-108 coating intermediate.

## CARBIDE AND CARBON

**H. D. Hughes** has been appointed general sales manager and **E. E. Fogle,** sales manager, of the Industrial Chemicals Division, Carbide and Carbon Chemicals Company. Mr. Hughes joined the sales department of Carbide and Carbon in 1928. Mr. Fogle joined the firm in 1930.

## KOPPERS COMPANY

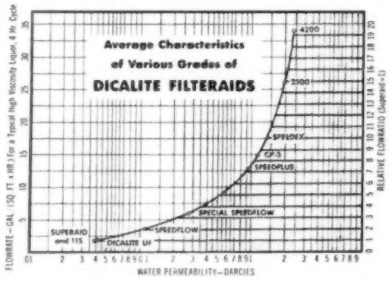
**M. W. Gaylord** has been appointed assistant manager of the research administration section of the research department. He will be located at the firm's Verona, Pa., research center. His previous position was as production manager of Koppers Gas and Coke Division.


**—To Guarantee Constant Quality and Ample Supply in *Every* Grade**

In that one fact — many deposits, with slight natural differences between them — lies the reason why you are assured of both uninterrupted supply and top quality when you use any DICALITE material.

Take, for example, one major group of DICALITE products . . . the Filteraids. Look at the chart below; notice the wide range of clarity and filtration "speed" available to you for maximum operating flexibility and economy. That's the great advantage given us by a number of different deposits — a *head start* to controlled quality through choice of the best crude "ore" for each product. And naturally, DICALITE'S multiple sources of raw material is your assurance of uninterrupted supply.




WHATEVER YOUR NEEDS—YOU'LL DO BETTER WITH Dependable GREAT LAKES Dicalite DIATOMACEOUS MATERIALS

DICALITE DIVISION, GREAT LAKES CARBON CORPORATION • NEW YORK 17 • CHICAGO 1 • LOS ANGELES 17

# The OLD WAY WAS NEVER EASY LIKE THIS

## with BOWSER XACTO METER

## . . . FOR SAFE, PRECISE PAINT-MAKING!

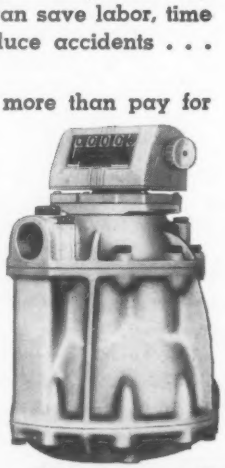
**Bowser Xacto meters can simplify your paint-making habits, too! Now, the measurement and distribution of liquid ingredients in many paint, lacquer and varnish plants is safer, easier, more accurate and less costly than ever before—thanks to Bowser Xacto meters.**

**Compare the two methods (yes, bucketing is still extensively used) . . . and it's easy to see why Xacto can save labor, time . . . prevent waste from spillage . . . reduce accidents . . . and minimize fire hazards.**

**Chances are Bowser Xacto meters will more than pay for themselves within the first year.**

## FOR PRODUCT UNIFORMITY

**For more than a quarter of a century Bowser Xacto meters have been widely used wherever extreme accuracy has been an important requirement. Xacto meters eliminate guesswork . . . they can be set to deliver predetermined quantities and shut themselves off . . . or even print a delivery ticket when desired.**



**Xacto handles more than 662 different liquids**

*Our Engineers are at Your Service. Write TODAY!*

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1377 CREIGHTON AVE., FORT WAYNE 2, INDIANA

Regional Offices • Atlanta • Chicago • Cleveland • Dallas • Kansas City • New York
San Francisco • Washington, D. C. • Canadian Plant and Sales, Hamilton, Ontario


### WITCO

**Max A. Minnig,** vice president and national sales manager of rubber chemicals, has been made a director of sales for the company. He joined Witco in 1946 in the natural gas division of carbon black operations.

M. A. Minnig

William Wishnick has been named assistant to Mr. Minnig. He joined the firm in 1949 after graduating from the University of Texas. Mr. Wishnick's first post with Witco was in the Chicago asphalt sales division.

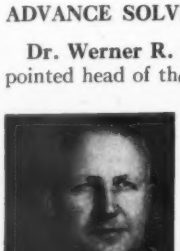
### PITTSBURGH PAINT

**Walter W. Ethier, Jr.** has been named assistant divisional director at Newark, New Jersey, a new position established in the firm's paint and brush division. He was manager of the Corona chemical division prior to his appointment. Mr. Ethier started with the Pittsburgh Plate Glass Company in the technical department of the firm's Milwaukee paint plant in 1939. After serving over four years in the Paint Division purchasing department, he was made manager of the Corona chemical division in 1948.

W. W. Ethier, Jr.

### ADVANCE SOLVENTS

**Dr. Werner R. Husen** has been appointed head of the newly formed resin specialty department. Dr. Husen desires to work closely with his many friends in the industry and he invites inquiries for specialty resins which are best produced in custom control batches. Production of a new group of specialty synthetic resins will round out the line of driers, stabilizers, plasticizers, wetting agents and fungicides which the Advance Solvents and Chemical Corporation has been supplying to the protective coating industry.



W. R. Husen

### GIVAUDAN-DELAWANNA

**A. T. Fiore** has been appointed coordinator of new product development and service laboratories. He joined Givaudan 20 years ago as chemist in charge of the analytical department, and since 1934 has been a research associate of the Givaudan Corporation, from which position he received his present appointment. Mr. Fiore is a graduate of Fordham University, where he received a B.S. and an M.S. degree in chemistry.

A. T. Fiore

### AMERICAN CYANAMID

**W. B. Lambert** has been appointed branch sales manager of the newly opened Coating Resins Department branch office in Cincinnati, Ohio. He joined the firm in 1925.

**Robson G. Head** has been appointed sales manager of the plastics and resins division of North American Cyanamid Limited. He will supervise the sales activities of the division in Canada. Mr. Head joined the firm in 1945 as a Canadian technical sales representative.

### AMERICAN-MARIETTA

**V. Muir Rogers** and **Leigh R. Gignilliat, Jr.** have been elected members of the firm's board of directors. Re-elected to the board were: Chairman, Grover M. Hermann, H. J. Hemingway, R. L. Oughton, C. S. Beaver, David W. Kahane, Joseph H. Briggs and S. W. Flesheim. Mr. Rogers, American-Marietta's vice president in charge of industrial sales, has been with the firm since 1939. Mr. Gignilliat is vice president of the American National Bank and Trust Company.

### 20TH CENTURY PAINT

**David S. Lifson** has been elected president of the firm. **Harry N. Weiss,** former president, was named chairman of the board of directors and **Theodore M. Friedmann** was named secretary-treasurer. The changes are in anticipation of Mr. Weiss' retirement from activity in the 20th Century Paint and Varnish Corporation within six months, or sooner, if a suitable executive is engaged to take over his administrative position.

D. S. Lifson

### SHERWIN-WILLIAMS

**H. E. Spitzer** has been named director of development. He will continue to headquarter in Chicago. In his new post, Mr. Spitzer will supervise all of the firm's development laboratories, except the trade sales development section, which is headed by S. F. Carlson in Cleveland. Mr. Spitzer joined Sherwin-Williams in 1937. His most recent position was as general supervisor of the paint, varnish and lacquer development laboratories in Chicago.

### FRANKLIN PAINT

**LeRoy A. Chloupek** has been appointed technical director. He has been associated with the paint, lacquer and synthetic resin industry for eighteen years.

### SHIELD COATINGS

**Dr. Emil Milost,** a specialist in paint formulation and resin design, has joined the staff of the Shield Coatings Corporation, Verona, New Jersey. He had previously been associated with the Industrial Resin Corp., France, Campbell & Darling, Inc., and the Vita Var Company.

### GLIDDEN

**George J. Seith** has been appointed sales manager of the firm's Mississippi region, with factory headquarters in St. Louis, Mo. In his new position, Mr. Seith will be responsible for the sale of Glidden paints in an area embracing Missouri, Arkansas, Oklahoma, Kansas, Colorado, and Wyoming, together with parts of Illinois, Kentucky, Indiana, Tennessee and Mississippi. Mr. Seith has been a member of the firm's sales organization since 1947.


Chats about Finishes

NEW PARLON® FINISHES FOR AIR CONDITIONING

*by*

C. A. GRANT

*District Manager,*
*Hercules' Cellulose Products Dept.,*
*Chicago, Illinois*

Recently developed chlorinated rubber coatings offer improved protection and increased flexibility in air-conditioning equipment finishes. These new Parlon finishes permit double dipping so that adequate film protection is assured on sharp edges and hard-to-spray regions. They will withstand baking temperatures of 325°F., thus can be cured in the same oven at the same time as parts having a decorative urea-alkyd coating. Hardness and mar resistance is greatly improved so that it is equivalent to that of a urea-alkyd enamel. Perhaps most important of all, these new Parlon coatings will continue to protect the metal substrate after more than 20 months of continuous immersion.

A letter or card addressed to me or our home office will bring further details on these unique new finishes.

*c a grant*

*Cellulose Products Department*
*HERCULES POWDER COMPANY*
INCORPORATED
*926 Market Street, Wilmington 99, Del.*

IC53-3

## WATSON-STANDARD

**Charles H. Groff** has been appointed technical director of the firm. In his new post, Mr. Groff will direct an expanded program of research and development of the firm's line of paints, varnishes, lacquers, and plastic compounds for diversified fields of industry. He was formerly technical director of Surface Chemicals, Inc. and returns to Watson-Standard where he was assistant technical director from 1943 to 1946.



C. H. Groff

## NEW JERSEY ZINC

**S. S. Goodwin,** manager of mines, has been elected a vice president of the firm with headquarters in New York. He will be responsible for the mining and exploration of the firm, and will retain his title as manager of mines. Mr. Goodwin was appointed manager of mines in 1950.

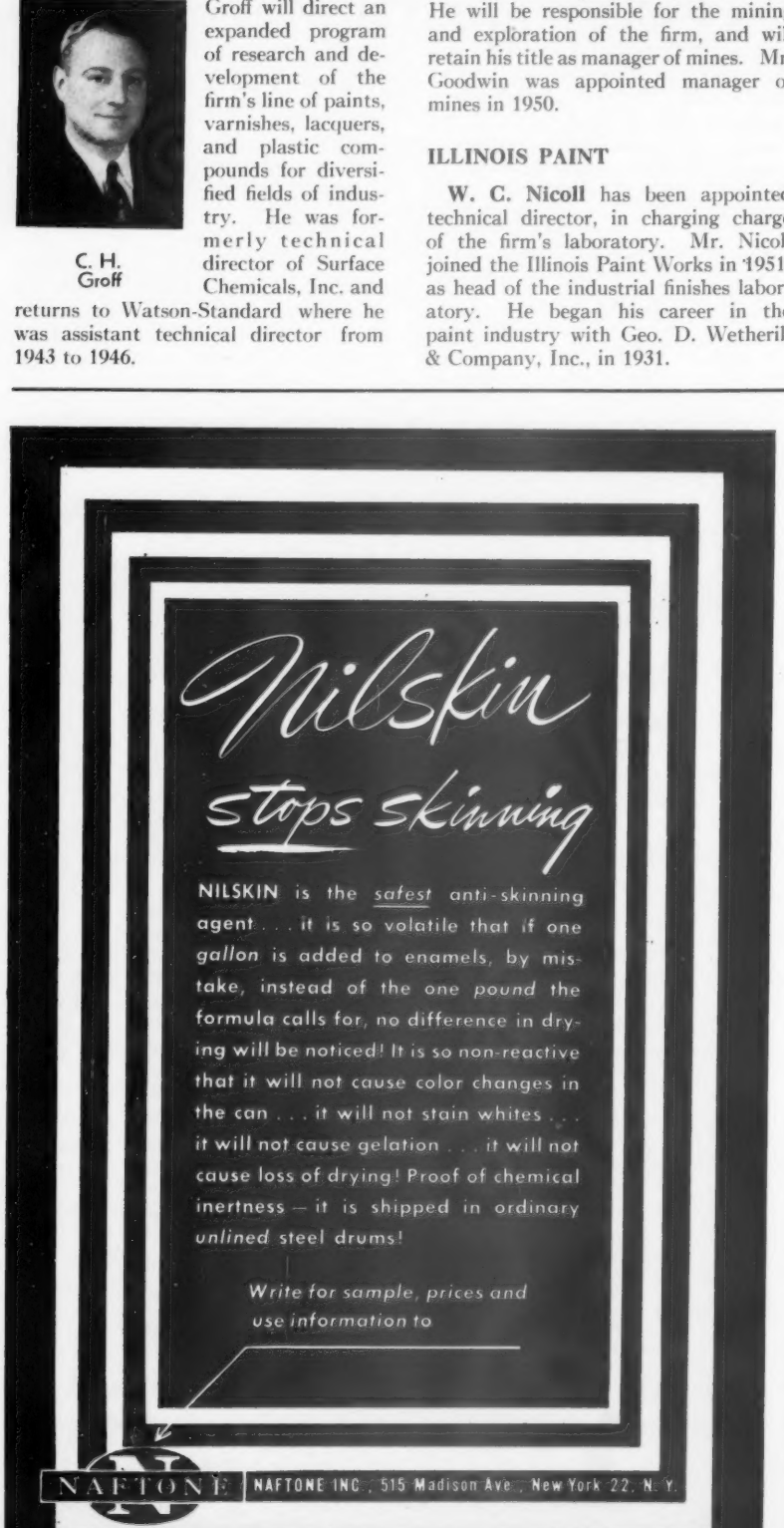
## ILLINOIS PAINT

**W. C. Nicoll** has been appointed technical director, in charging charge of the firm's laboratory. Mr. Nicoll joined the Illinois Paint Works in 1951, as head of the industrial finishes laboratory. He began his career in the paint industry with Geo. D. Wetherill & Company, Inc., in 1931.

## MARBON

**D. M. Pratt** has been elected vice president and sales manager. He joined the Marbon Corporation in 1934 as a laboratory technician. Later, Mr. Pratt went into sales work, becoming sales manager in 1946. Before coming to Marbon, he was associated with the Goodyear Tire and Rubber Company, Akron, Ohio, and for a time was sales representative for Herron and Meyer of Akron, who are sales agents of crude rubber and rubber compounding materials.

D. M. Pratt



Nilskin
stops skinning
NILSKIN is the safest anti-skinning agent . . . it is so volatile that if one gallon is added to enamels, by mistake, instead of the one pound the formula calls for, no difference in drying will be noticed! It is so non-reactive that it will not cause color changes in the can . . . it will not stain whites . . . it will not cause gelation . . . it will not cause loss of drying! Proof of chemical inertness — it is shipped in ordinary unlined steel drums!
Write for sample, prices and use information to
NAFTONE
NAFTONE INC., 515 Madison Ave., New York 22, N. Y.


## WITCO

John H. Wishnick, manager of the Chicago plant, has been placed in charge of chemical manufacturing at the Chicago and Brooklyn plants. He joined Witco as a petroleum engineer for the Continental Carbon Company.

Joseph Tumpeer, sales manager of the asphalt division, has assumed charge of the manufacturing operations at Lawrenceville, Ill., and Perth Amboy, New Jersey.

## CELANESE

**D. Y. Miller,** chemical engineer, has been assigned to the Market Development Department of the Textile Division, and will shortly move to the Charlotte, N. C., office.

**H. B. Bartley, Jr., N. G. Baker** and **Henry Jamison** have joined the sales staff of the Chemical Division. Mr. Bartley and Mr. Baker are assigned to the New York office and Mr. Jamison is attached to the Chicago office.

## GLIDDEN

**H. L. Rhodes** has been appointed manager of the Chemicals-Pigment-Metals Division plant at Oakland, Calif., and E. L. Ralston has been named manager of the firm's mining properties in California and Nevada. Mr. Rhodes joined Glidden in 1920. In the mid-1930's he supervised the design and construction of the Glidden titanium dioxide plant in Baltimore, later becoming manager of all Baltimore operations for the firm. Mr. Rhodes was named manager of Glidden's mica and ilmenite mine at Lenoir, N.C., in 1940. In his new post, Mr. Ralston will direct operations of the company's zinc and copper mines in Shasta County, Calif., as well as the firm's barytes mines at Battle Mountain and Tonopah, Nevada. He has been with Glidden 26 years.

## 1952 DEVELOPMENTS

(*From page 44*)

propellers so that the entire 10 gallon water content is constantly in motion.

27.4.2. EMIL GREINER CO. 1. Mechanical convection oven provides constant air weight circulation at all temperatures with minimized temperature stratification, greater uniformity, elimination of surface burns, visual evidence of air flow, longer service. 2. Flash Still obtains equilibrium flash vaporization data for petroleum mixtures as easily as determining ordinary boiling point data. This is accomplished by the design of a modified recirculation type Othmer Still. The still always obtains true equilibrium, which is normally not the case in continuously operated pilot plant equipment.

27.4.3. LABLINE, INC. Warmer plate used for keeping solutions at desired temperatures for evaporation below boiling point, or as an utility heating plate up to 100 C.

27.4.4. PRECISION SCIENTIFIC CO. 1. "Frigstat" bath provides frost-free, efficient operation with a minimum of temperature control adjustment. Designed expressly for following ASTM Method D97, the bath can easily be maintained within 2 F. The 7-unit test chamber and dry ice chamber are insulated with glass wool. Cooling medium is circulated in the test chamber through coils which do not allow interchange of fluid between chambers. A full charge of dry ice plus the ¼ HP pump will reduce temperature of the test chamber to -90 F in about ½ hr. 2. Flash tester, electrically-heated, used for determining the fire points of volatile, flammable liquids flashing below 175 F. in accordance with ASTM Method D-56.

27.4.5. PYROMETER INSTRUMENT CO. Pyro surface pryometer is available with a selection of 14 different types of thermocouples and extension arms to meet every surface and subsurface temperature measuring problem. Temperature readings can be taken readily from the large 4¾ inch direct-reading dial.

27.4.6. EDWIN L. WIEGAND CO. Laboratory hot plate is equipped with graduated heat control to permit variability of first 50% of total wattage of the unit making it possible to maintain continuously the desired temperature.

**Other Laboratory Equipment**

27.5.1. L.R. BRADLEY & CO. Moisture Meter, Model BD-10, tests moisture content of wood, shingles, plaster, stucco, brick and concrete.

27.5.2. BRANSON INSTRUMENTS, INC. Coating gage is described in 6-page folder. Used to measure thickness of non-magnetic coatings on magnet base and to detect pin-holes in non-conductive coatings on conductive bases.

27.5.3. ERTEL ENGINEERING CO. Laboratory-size multiple-disc filters are useful for filtration studies or can be used in production on a small scale. Lucite frame allow operator to watch the course of filtration runs. Available in four inch size with eleven square inches per sheet and also in eight-inch size having 52 sq. inches per sheet.

27.5.4. FISHER SCIENTIFIC CO. 1. Stainless steel tops for laboratory furniture is designed to fit basic models of "Unitized" laboratory furniture. 2. Stirrer has wide application with its three shafts to give 140, 825 or 5000 rpm from off to maximum by the rheostat. 3. Magnifier which simplified thermometer reading is equipped with a pair of spring clamps. Easily snapped onto any standard thermometer, it can be moved up or down to any desired position.

27.5.5. GARDNER LABORATORY, INC. 1. Paint strainer has an aluminum coated steel wire stand that supports an aluminum funnel in which a copper-mesh strainer is held in place by a steel wire loop. 2. Simple and rugged washability machine is used for testing washability characteristics of paints, varnishes, lacquers, linoleum, etc. The unit enables laboratory and factory to produce exact specifications. 3. Two leaflets describe Gardner Film Casting Knife and Washability apparatus. 4. Catalog covers some 80 items used in the testing of paints, varnishes and allied coatings. Description of each apparatus is given together with photographs, specifications and recommended tests.

27.5.6. GENERAL ELECTRIC CO. issued 80 page catalog summarizing all of General Electric Co. testing and measuring equipment for laboratory and production line use.

27.5.7. EMIL GREINER CO. One-Pan Beranger Balance is designed to provide, fast, accurate weighings without loose weights.

27.5.8. HAGEN CORP: Burette unit features polyethylene reservoir which requires only a squeeze to fill an automatic self-leveling burette.

27.5.9. LABORATORY INDUSTRIES- INC. 1. Electric Stop Watch with special counting unit, built-in reset mechanism and high torque synchronous motor is designed to function as a single unit. 2. Aluminum Dessicator cannot be damaged by bumping or dropping and weighs a fraction of comparable glass dessicator. Ground joint seal assures air tight closure and aluminum body dissipates heat quickly.

27.5.10. MINE SAFETY APPLIANCE CO. Low-cost instrument detects concentrations of aromatic hydrocarbons. Separate graduations for benzene, toluene and xylene.

27.5.11. MOISTURE REGISTER CO. Eletronic moisture testing instrument for measuring the moisture content of dry granular materials including paint pigments.

27.5.12. H.R. MOORE CO. Coating Analyzer provides comparative data on drying characteristics, surface hardness, fineness of grind, and effect of water immersion at various stages of cure.

27.5.13. MURPHY and MILLER. Humidity testing cabinet with 26 cu. ft. working area will supply relative humidity between 20% and 95% in the temperature range of plus 35 to 185 F.

27.5.14. NORTH AMERICAN PHILIPS CO., INC. pH meter designed for all pH and rH work, for potentiometric titrations and for oxidation-reduction-potential investigations.

25.7.15. OHAUS SCALE CORP: 1. Undivided tare will render this triple beam balance useful in the laboratory and industrial applications where it is desirable to obtain net value of the product being weighed without further calculations. Full load capacity of 2610 grams with a sensitivity of 1/10 gram. 2. Heavy duty balance with self-aligning bearings improves the sensitivity by reducing friction and increasing life of balance. Sensitivity of 1 gram under loads up to capacity of 20 kilograms.

25.7.16. TABER INSTRUMENT CO. 1. Taber Abraser, Model 140, is a test instrument designed to evaluate the resistance of surfaces to rubbing abrasion. 2. Description of all types of specimen holders used with the Taber Abraser are given in Bulletin 5105.

25.5.17. VOLAND & SONS. Analytical balance with weighings accurate to fourth decimal place in a matter of seconds.

**Educational**

28.1.1 Educational courses in paint technology are being presented at:

Alabama — University of
California — Los Angeles City College
California — City College of San Francisco.
Illinois — Illinois Institute of Technology.
Kentucky — University of Louisville.
Michigan — University of

Michigan — Wayne University
New Jersey — Newark College of Engineering
New York — Brooklyn Technical High School
New York — Brooklyn Polytechnic Institute.
New York — New York University
North Dakota — North Dakota State Agricultural College.
Ohio — Case Institute of Technology.
Texas — Agricultural and Mechanical College of Texas.
Washington — University of Washington.

28.1.2. Fellowships and research projects include:

1. American Cyanamid Co. award fellowships in chemistry and chemical engineering. Awarded to graduate students in their final predoctorate year of study, they carry a stipend of $1500 plus full tuition and lab fees. Also include $300 for the Department of the University. Approximately 17 fellowships were granted.

2. Emery establishes fellowship at the University of Cincinnati for the study of the chemistry of fats and oils.

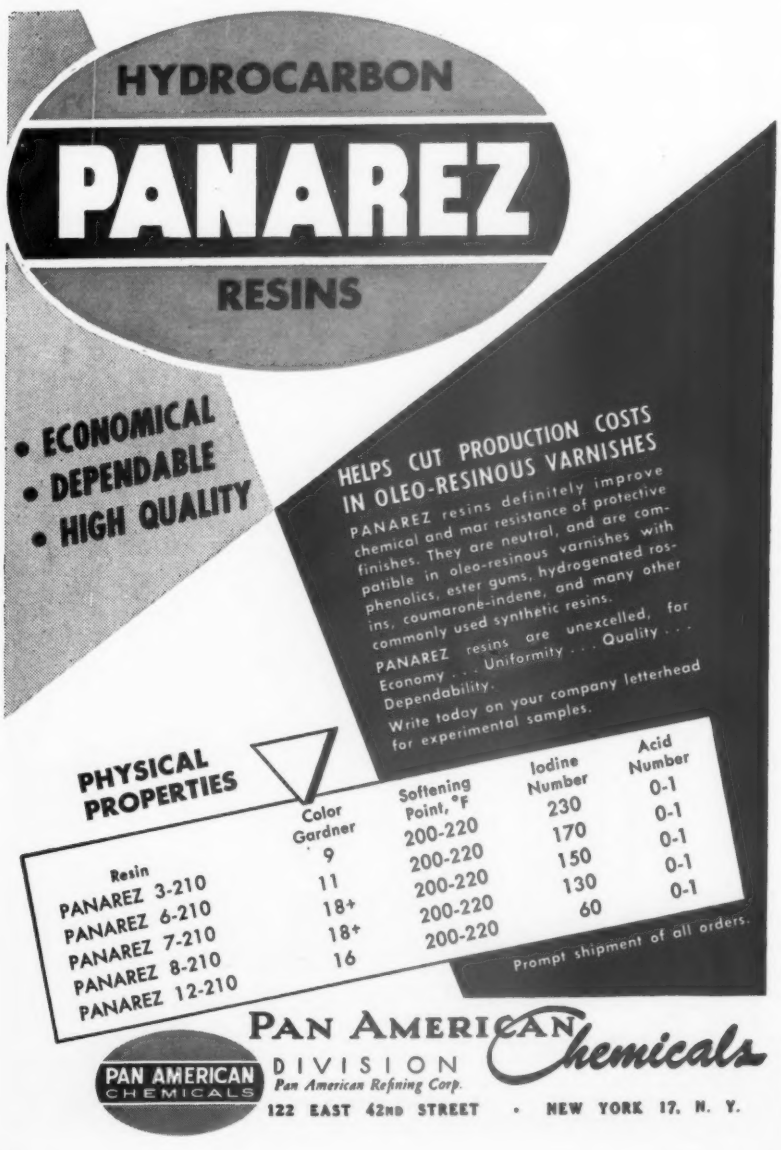
3. Morehouse sponsoring research project at University of Alabama to determine the effects of the particle size of the carborundum in the stones, rate of feed, components of various systems, viscosity of feed materials, effect of vehicle solids on the handling of the material, use of wetting agents and dispersion aids, and other pertinent data of benefit to the industry using this equipment.

4. National Printing Ink Research Institute of Lehigh University is focusing their attention on a study on the printing of solids in order to standardize terminology and obtain a numerical system for evaluating printability and quality.

5. Plaskon sponsors fellowship at Carnegie Institute of Technology on the synthesis of 3,3′, 5,5′-tetrafluorohydrazobenzene.

28.1.3. Chartrand (181) suggests that technical information would have its maximum value if it were presented in a similar pattern consisting of title, author, date, source, object, summary of conclusions, materials, preparation of materials, application of materials, results, discussion, recommendations and bibliography.

28.1.4. Heiberger (226) revies the characteristics of porcelain enamels. New methods of production and new types of ceramic coatings, devised to lower cost, decrease chipping and increase versatility are making it possible for ceramic coatings to move into coating areas that traditionally have been finished with organic coatings.



### Books of Interest

29.1.1. AMERICAN MANAGEMENT ASSN. "Planning and Developing the Company Organization Structure," by Ernest Dale. 232 pp. $4.50. A research report analyzing the development and change of the organizational structure of the individual company, both from the standpoint of systematic methods and that of practical common sense solutions used in business. The two main sections of the book deal with first, organization growth problems and, secondly, the mechanics of organization.

29.1.2. CHEMICAL PUBLISHING CO. 1. "The Manufacture of Intermediates and Dyes," by. G.H. Frank. 177 pp. $4.50. "How-to-do"type book discussing methods and materials used in the manufacture of dye intermediates. Additional sections are devoted to plant equipment used, testing methods and formulas for calculating results. 2. "Technology of Coated and Processed Papers," edited by R.H. Mosher, 736 pp. $15.00. Contains contributions of ten authors discussing types of formulations and methods of manufacture used by paper converters as a class.

29.1.3. CHEMONOMICS, INC. 1. Communication of Technical Information, by. R.M. Dederich. 116 pp. $5. Written for engineering and science students, technical workers, and management men, covering the theory and practice of technical communication.

2. Patents for Technical Personnel. W. Wade, 40-pp. $3. Reference manual on inventions and patents, intended to supply supervisory and technical employees and technical students with

information on the functions of a Patent Department, recognizing an invention, keeping records, protecting patents, and benefits to be derived.

29.1.4. THE ELSEVIER PRESS, INC. Corrosion Guide by E. Rabald, 629 pp. $12.50. Aimed specifically for the practicing chemist or engineer, this volume goes lightly over fundamental considerations, giving only enough theory to permit correct interpretation of data, and emphasizes rather the type of information needed by a technician in actually preventing corrosion.

29.1.5. INTERSCIENCE PUBLISHERS, INC. 1. Styrene, by. A.L. Ward and W.J. Roberts. 132 pp. $3.50. Information on the investigation, production, and application of styrene has been presented in a straight-forward manner, on the basis of the original literature and of the experiences of the authors. 2. Pulp and Paper, Vols., I and II, by J.P. Casey. $15 each. Vol. I is concerned with the chemistry of pulp and papermaking operations. Vol. II is concerned with the properties of paper and the basic paper-converting operations — such as pigment coating, printing, coating with resins and waxes, and saturation of paper with resins and waxes.

29.1.6. MCGRAW-HILL BOOK CO. 1. Basic Methods of Marketing Research, by J.H. Lorie and H.V. Roberts, 453 pp. $6. Nontechnical text discussing basic tools underlying marketing research, such as experimentation, sampling, observation and communication, rather than specific applications of these tools. Stresses theory of marketing research and treats developments in pertinent fields of statistics, psychology, economics, sociology, etc. 2. Business Forecasting, by. F.D. Newbury, 273 pp. $4.75. Book reviews principles and practices of "organized" business forecasting, taking into account fundamental economic principles. Forecasting is treated as a practical management tool in business life. 3. McGraw-Hill Directory of Chemicals and Producers, edited by T.L. Bonnitt, 626 pp. $20. The second revised edition of the index devoted to listing for the American chemical industry prime producers and manufacturers, including refiners and processors, along with the chemicals they make and the grades produced. 4. Sampling Inspection by Variables by A.H. Bowker and H.P. Goode, 216 pp. $5. A summary of steps involved in setting up a sampling inspection plan where item quality is expressed on a variable basis, as opposed to plan operating on an attribute basis. 5. Human Relations in Supervision, by W.E. Parker and R.W. Kleemeier, 472 pp. $4.50. Directed to the first-line supervisor — whether foreman or office manager — this volume is concerned with the human factor in business and industry. In emphasizing the role and significance of the supervisor in dealing with the human relations aspects of his job, the authors apply the findings of modern psychology to problems of training, motivation, frustration, and discipline.

29.1.6. OXFORD UNIVERSITY PRESS. Synthetic Resins and Allied Plastics, by R.S. Morrell, 747 pp. $10. Various sections written by experts are devoted to the different types of resins and plastics, along with chapters dealing with revised theories, problems of resinification, electrical testing, and methods of identification and testing.

29.1.7. PRENTICE-HALL INC. Principles and Methods of Chemical Analysis by H.F. Walton, 420 pp. $6.50. A study of the fundamentals of modern non-instrumental analysis, with emphasis on basic physico-chemical principles, this book is written for the student with a knowledge of physical chemistry.

29.1.8. REINHOLD PUBLISHING CORP. 1. The Physical Chemistry of Surface Films, by W.D. Harkins, 413 pp. $10. A detailed treatise cover-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ing the author's experimental and theoretical studies in two important fields of physical chemistry — surface chemistry and solubility. A final section deals with the mechanism of emulsion polymerization.

2. The Surface Chemistry of Solids, by. S.J. Gregg, 297 pp. $8.50. As a survey of the various branches of the surface chemistry of solids, this book is concerned with general principles rather than details of observations or descriptions. The author covers all those chemical and physico-chemical phenomena which relate to the activity of the surface of a solid, or to the interface between a solid and other substance.

3. Glycols, by G.O. Curme and F. Johnston, 389 pp. $12. Complete information on glycols now in commercial production or whose manufacture has been or could be conducted on a commercial scale. Discussed from the technical viewpoint.

29.1.9. THE TEXAS CO. Properties of the Principal Fats, Fatty Oils, Waxes, Fatty Acids, and their Salts, by M.P. Doss, 244 pp. $5.00. The properties of approximately 50 of the principal fats, fatty oils, and waxes; more than 800 aliphatic acids, and data on salts of fatty acids ranging from aluminum to zirconium are included.

29.1.10. D. VAN NOSTRAND CO. 1. The Essential Oils, Vo. V, by E. Guenther, 507 pp. $9.75. The physicochemical properties, chemical composition, production and uses of individual essential oils is covered. 2. Data Book on Hydrocarbons, by J.B. Maxwell, $7. is a handbook of up-to-date information on hydrocarbons and petroleum fractions. Includes basic data on hydrocarbons and petroleum fractions; methods of applying these data to process engineering; and applications of certain of the unit operations of chemical engineering used in the petroleum industry. 3. Chemical Trade Names and Commercial Synonyms, by. W. Haynes. 279 pp. $5.50. As a dictionary of trade terms, this volume gives for each trade name its chemical composition, indicative uses, and source. The book confines itself to the chemicals and chemical specialties sold in the industrial field.

29.1.11. JOHN WILEY & SONS, INC. 1. Paint and Varnish Production Manual, by V.C. Bidlack and E.W. Fasig. 288 pp. $6.50. Assembling basic facts involving production facilities and methods employed by the paint industry, this volume was written with the purpose of educating management and production personnel concerned with the manufacture of surface coatings. 2. Color in Business, Science, and Industry, by D.B. Judd, 401 pp. $6.50. A discussion of the psychophysics of color in the practical terms of purchase, production and sales. Guided by the belief that color problems are business problems, the author explains the details of color science — the "basic facts," tools and techniques, and the use of physics and psychophysics of colorant layers. 3. Statistical Methods for Chemists, W.J. Youden, 126 pp., $3. Writing from a laboratory standpoint, the author directs this book to those who "make measurements and interpret experiments;" he presents for the scientist the modern statistical system of units for expressing scientific conclusions.

29.1.12. DEPARTMENT OF COMMERCE: 1. Selling the United States Market by G.E. Larson and M.N. Poteat, 144 pp. $1. Guidebook specifically designed to aid the newer and smaller manufacturer, gives information on distribution facilities and methods, the development of a good product and the finding of U.S. markets for it. 2. Quartermaster Research on Water Resistant Textiles, PB 105661, 186 pp. $5. Latest developments in the Army's Quartermaster Corps work on water repellent treatments for textiles. 3. Development of Protective Coatings for the Aluminum Combat Canister Mill, PB 106607 $3.75. Describes representative types of organic coatings used for the protection of metals against the corrosive action of chemical agents.


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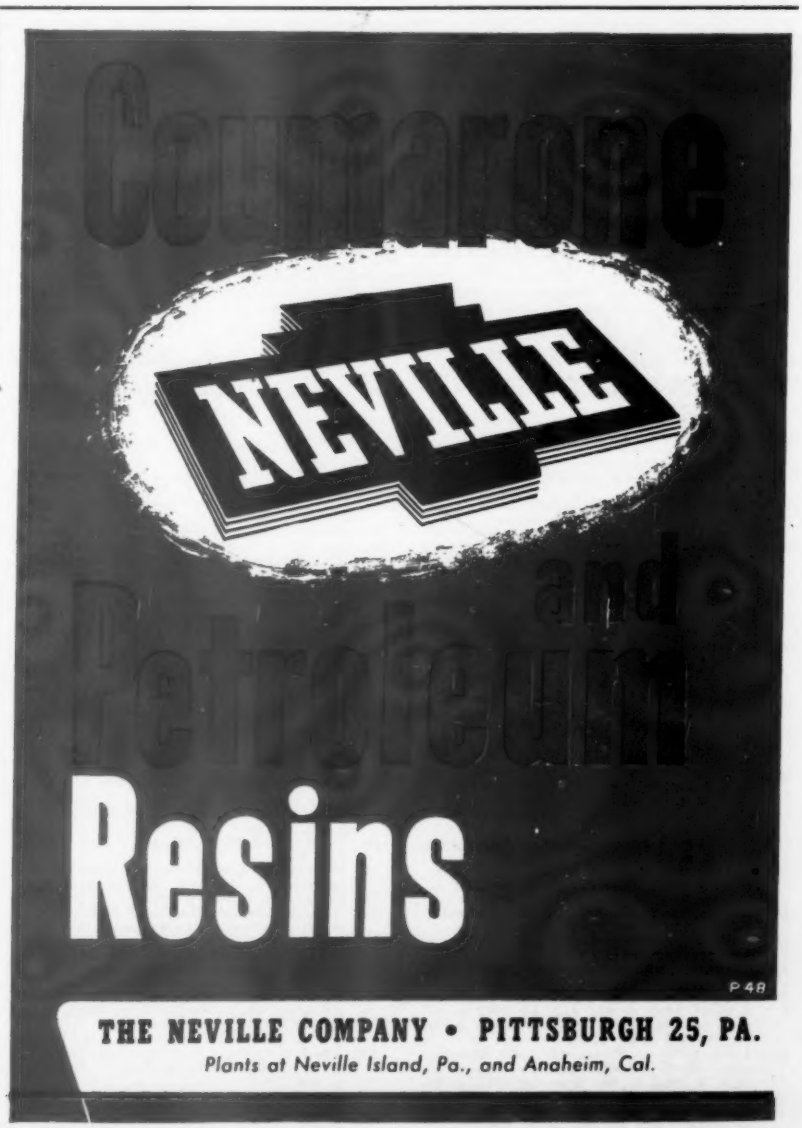

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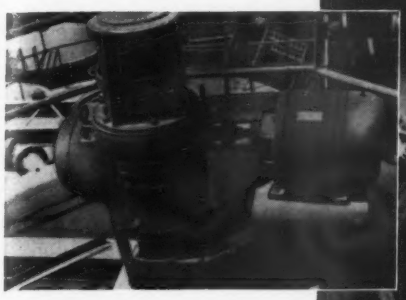

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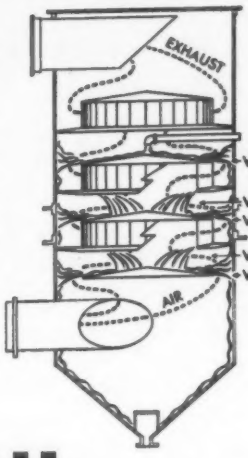


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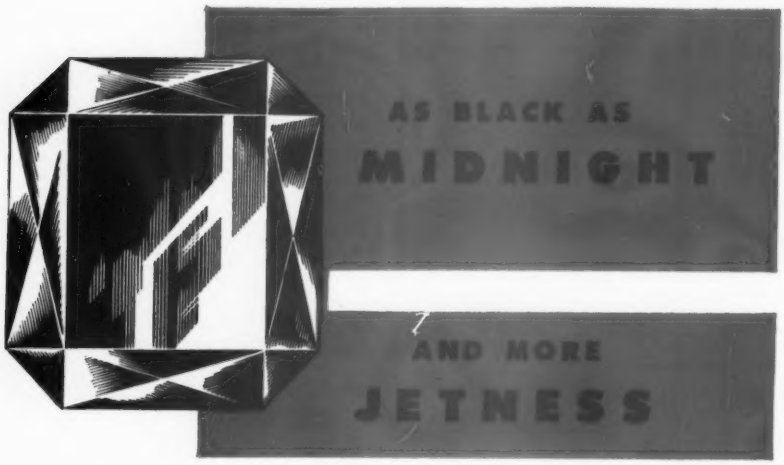


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## Material Handling Clinics Will Be Conducted in 1953

Travelling material handling clinics to discuss local handling problems with chapter members of the American Material Handling Society in principal cities will be conducted during 1953, according to a decision of the Board of Directors of the Material Handling Institute, Inc.

The decision was made at the January 26th meeting of the MHI in New York City.

Each of the several travelling groups will be headed by an MHI officer with specialists in each type of material handling problem, selected from the membership of the Institute.

In each city the specialists in the travelling panels will describe the proper use of material handling. Then, AMHS members and other users of material handling equipment present at the meetings will outline specific problems from the floor to be analyzed by the panel of MHI specialists.

The clinics will be scheduled to meet requests from AMHS chapters and will begin in the early spring and continue throughout the years.


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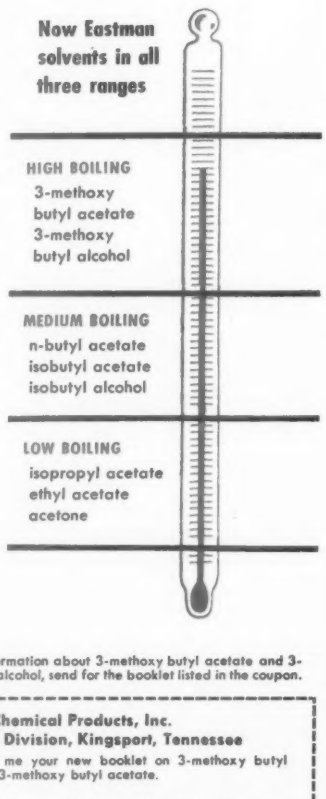
|---|---|---|
| Specific gravity 20°/20°C. | 0.921—0.923 | 0.952—0.958 |
| Boiling range | 157—162°C. | 164—174°C. |
| Weight per gallon | 7.65 lbs. | 7.96 lbs. |
| Evaporation rate (n-butyl acetate =1) | 0.11 | 0.13 |
| Dilution rate Toluene..... VM & P Naphtha.. | 3.64 0.69 | 2.60 0.92 |

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# TECHNICAL Bulletins

## ORGANIC CHEMICALS

The 1953 edition of the booklet, "Physical Properties of Synthetic Organic Chemicals," has been issued by Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation. This 20-page booklet is issued annually and is an important guide for users of organic chemicals.

This year for the first time the booklet, "Physical Properties of Synthetic Organic Chemicals," includes a section on 56 new research chemicals available from Carbide and Carbon. Among them are synthetic alpha-picoline, diethoxy tetrahydrofuran, a source of succindialdehyde, and four new vinyl monomers.

The new edition presents data on more than 320 products. For easy reference, the chemicals are arranged by family groups. Condensed data on applications are presented and physical properties are given in tabular form. Copies may be obtained without charge from Carbide and Carbon Chemicals Company, 30 East 42nd Street, New York 17, New York. Write for the "P.P.S.O.C." Booklet F-6136.

## TEST CHAMBERS

Tenney Engineering, Inc., 26 Avenue B, Newark 5, N. J. announces a two-color four-page bulletin on its standard line of temperature-humidity test chambers. Chambers covered in this bulletin can simulate temperatures from −100°F to +200°F and relative humidities from 20 to 95%.

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## ADDITIVES

Twenty-page catalogue contains complete information on Sindar's odors for industry, germicides and fungicides, stabilizers, anti-oxidants and anti-skinning agents.

The first thirteen pages are devoted to odors for industry, and list deodorants and reodorants developed by the Sindar technical laboratories. The products are classed according to the basic industrial commodities for which they are suitable such as paint, rubber, textiles, glues, plastics and others.

An important feature of this catalogue is a page devoted exclusively to odor types. Listed are seven of the most popular odor types with various Sindar products in each category.

Complete information is also given on Sindar's germicide, G-11 (Brand of Hexachlorophene) and fungicide, G-4 (Brand of Dichlorophene), as well as on stabilizers and anti-oxidants for use in the prevention of rancidity in vegetable oils, animal fats and fatty acids. Anti-skinning agents for use in printing inks and paints are also listed. Sindar Corp., 330 W. 42nd St., New York 36, N. Y.


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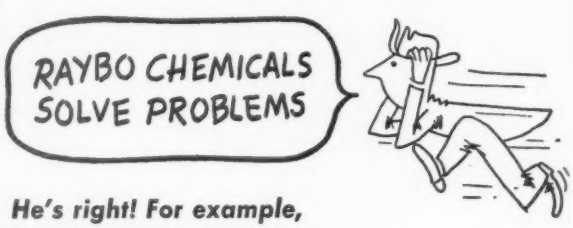


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### SELECTING PAINTS

"Paints — A Guide for Their Selection and Use for Interior Surfaces" is a 30-page report, which is available to members of the American Hotel Association. This report was prepared by the York Research Corp. of Stamford, Conn. upon the recommendation of the American Hotel Association Research Committee.

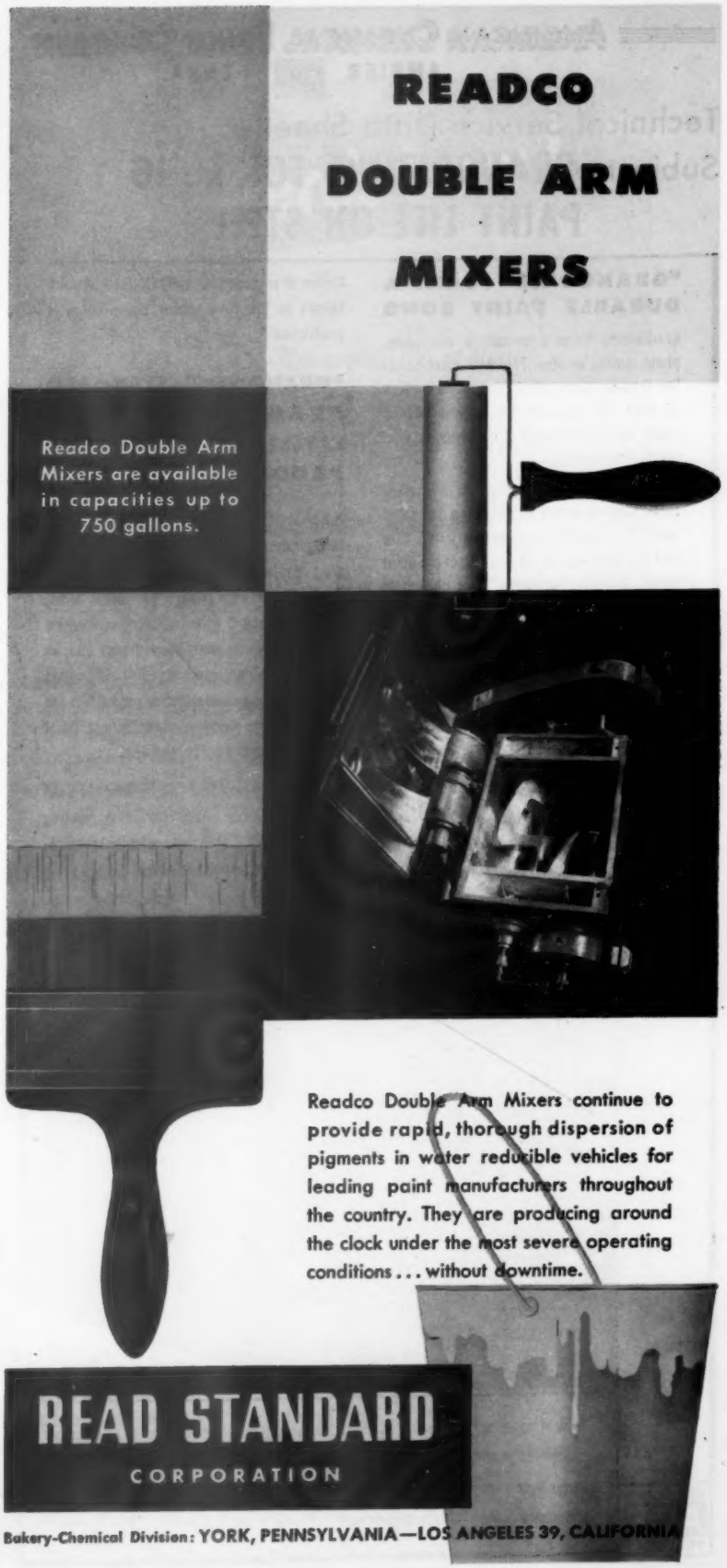
Part I of the manual is devoted to the composition of paint and how to apply it. One section discusses the techniques of applying paint with brush, spray gun or roller coater. There are clear directions for preparing new or old surfaces, whether wood, metal, plaster or wallboard. Recommendations for the use of suitable primer-sealers and undercoats are based on the latest findings and will lead to improved results.

Information on the new latex-emulsion paints also are included in the report, which describes both their limitations and advantages for hotel use. Other sections in Part I deal with such subjects as common paint failures, mildew, fire retardant paints, paint and varnish removers, health hazards, and best methods for paint storage, he pointed out.

Methods used to test various properties of the paints submitted for the project are discussed in Part II. A series of charts summarize the tests, and constitute a list of all acceptable products. Each paint is rated for 13 characteristics which pertain to over-all quality and performance, including ratings for hiding power, washability, brushing qualities, odor, chip resistance and flexibility. The types of paints tested included in the charts cover odorless, latex emulsion and both flat and gloss paints. Copies are available from American Hotel Association, 221 W. 57th St., New York 19, N.Y.

### INDUSTRIAL CASTERS

Sixteen page catalog covers the company's entire line of industrial casters and wheels. Request Catalog BC-53. Buffalo Caster & Wheel Corp., 1035 Broadway, Hamilton, Ill.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Technical Service Data Sheet
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3 Brushing, spraying, or flow-coating the work with portable hand equipment.

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Typical power spray washing machine for the automatic application of a protective phosphate coating to metal parts in preparation for painting. These 5" rocket motor tubes, as well as products made of cold rolled sheet steel, are effectively phosphate coated in such equipment.

CHEMICALS ACP PROCESSES


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